TOSHIBA
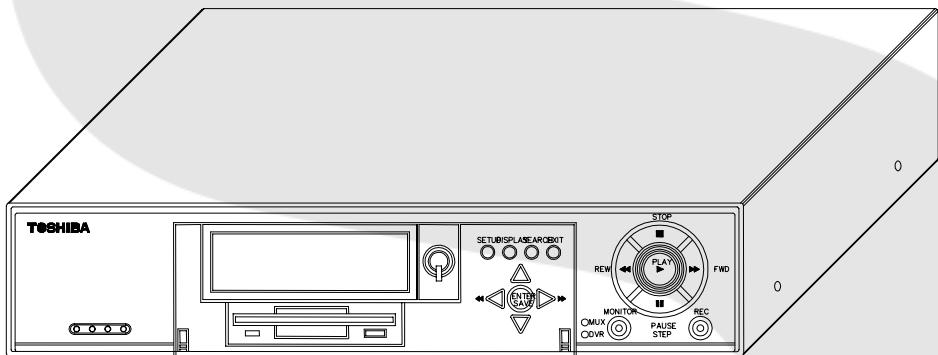
SERVICE MANUAL

DIGITAL RECORDER
KV-HD01A

SAFETY NOTICE

SAFETY PRECAUTIONS

LEAKAGE CURRENT CHECK

The AC line cord of power supply connect to terminal. And plug the AC line cord of power supply into a 120V AC outlet. Use an AC voltmeter, having 5000 ohm per volt or more sensitivity.

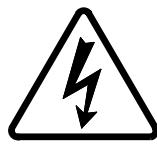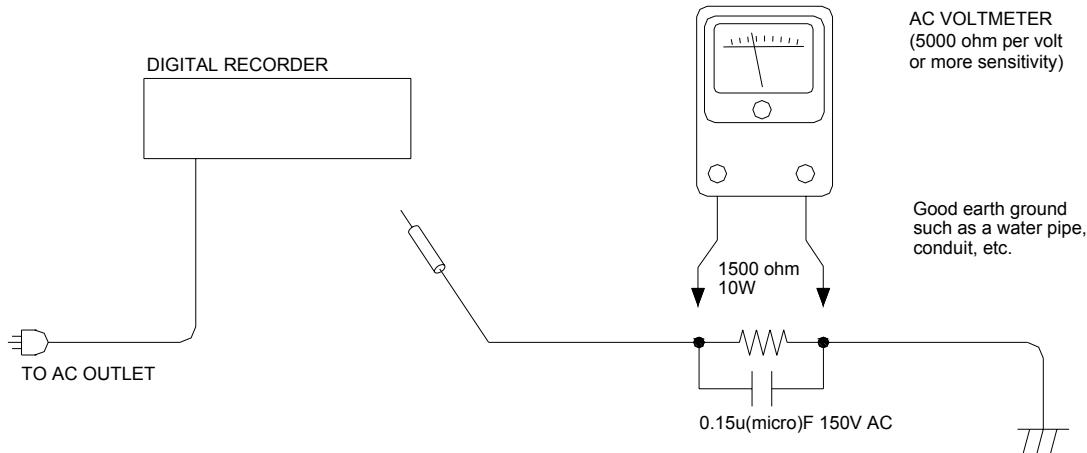Connect a 1500 ohm 10W resistor, paralleled by a 0.15uF

150V AC capacitor between a known good earth ground (water pipe, conduit, etc.) and all exposed metal parts

Measure the AC voltage across the 1500 ohm resistor. The test must be conducted with the AC switch on and then repeated with the AC switch off. The AC voltage indicated by the meter may not exceed 0.3V. A reading exceeding 0.3V indicates that a dangerous potential exists, the fault must be located and corrected. Repeat the above test with AC line reversed. NEVER RETURN A RECORDER TO THE CUSTOMER WITHOUT TAKING NECESSARY CORRECTIVE ACTION.

READING SHOULD NOT EXCEED 0.3V

DIGITAL RECORDER

AC VOLTMETER
(5000 ohm per volt
or more sensitivity)

Good earth ground
such as a water pipe,
conduit, etc.

1500 ohm
10W

TO AC OUTLET

0.15u(micro)F 150V AC

Test all exposed metal.
Voltmater Hook-up for Leakage Current Check

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

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SECTION 1
GENERAL DESCRIPTION

SAFETY PRECAUTIONS

WARNING
RISK OF ELECTRIC SHOCK
DO NOT OPEN

AVIS RISQUE DE CHOC ELECTRIQUE NE PAS OUVRIR

WARNING : TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK), NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

The lightening flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING: TO REDUCE A RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE. DANGEROUS HIGH VOLTAGES ARE PRESENT INSIDE THE ENCLOSURE. DO NOT OPEN THE CABINET. REFER SERVICING TO QUALIFIED PERSONNEL ONLY.

FCC NOTICE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reason-able protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not in-stalled and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

WARNING: Your authority to operate this FCC verified equipment could be voided if you make changes or modifications not expressly approved by the party responsible for compliance to Part 15 of the FCC rules.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

UL This product is Classified by the Underwriters Laboratories Inc. Representative samples of this product have been evaluated by UL and meet the applicable UL Standards and requirements.
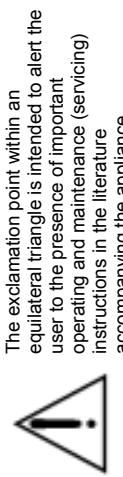
CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instruction.

In the spaces provided below, record the Model and Serial No. located on the rear panel of your Digital Video Recorder.

Model No._____ Serial No._____

Purchase Date:_____ Dealer/Address/Phone:_____

Retain this information for future reference.

1-1

1

2

IMPORTANT SAFETY INSTRUCTIONS

Read the following safety precautions carefully before using the product. These instructions contain valuable information on safe and proper use that will prevent harm and damage to the operator and other persons. Make sure that you fully understand the following details (indications, graphic symbols) before proceeding to the main descriptions in this manual.

Indication definitions

Indication	Meaning
⚠ **Warning**	This indicates that ignoring this label and/or misoperation of the product may cause serious personal injury or even death.
⚠ **Caution**	This indicates that ignoring this label and/or misoperation of the product may cause personal injury[*1] and/or material damage.[*2]

*1: Bodily injury means injuries, burns, and electric shock which does not require hospitalization or prolonged treatment.
*2: Physical damage means extended harm to home, household effects.

Graphic symbol definitions

Symbol	Meaning
⊘	Indicates a prohibited action that must not be carried out. The actual prohibited action is indicated in the symbol or nearby graphically or described in text.
❗	Indicates a mandatory action that must be carried out surely. The actual mandatory action is indicated in the symbol or nearby graphically or described in text.

❗ • **Do not use the product when abnormality occurs.**
The use in the abnormality status such as emitting smoke from the product, smelling burning, being damaged by drop, invasion of foreign objects inside the product, etc., may cause fire and/or electric shock. Be always sure to remove the AC adapter at once and contact your dealer.

⊘ • **Do not install the product near water – for example, near a bathtub, kitchen sink, laundry tub, wet basement, swimming pool, etc.**
This may cause fire and/or electric shock.

⊘ • **Do not repair, disassemble and/or modify yourself.**
Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

❗ • **Use the AC adapter only with the indicated power supply voltage.**
This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your location, consult your product dealer.

⊘ • **Do not put a vessel(s) filled with a liquid (flower vase, etc.).**
If a liquid enters the product, a fire and/or electric shock may occur.

⊘ • **Do not put the product in an unstable, slanting and/or vibrated place.**
Drop and/or fail of the product may cause injury.

⊘ • **Do not touch power or TV antenna cords during a thunderstorm.**
This might cause electric shock.

❗ • **Observe the following when installing.**
• Do not put the product on an inflammable material such as carpet or blanket.
• Do not put the product in a narrow space, since the heat generated from the product may be difficult to emanate.
• Do not put an inflammable material on the product.
If you do not follow above, the heat generated by the product may cause fire.

⊘ • **Do not put the product in direct sunshine and/or high temperature.**
The temperature rise inside the product may cause fire.

⊘ • **Do not put the product in a moist or dusty place such as a bathroom, a place close to a humidifier, etc.**
This may cause fire and/or electric shock.

⊘ • **Do not put the product in a moist, soot and/or dusty place such as a kitchen, etc.**
Do not put the product where a soot and steam may occur, such as a kitchen, etc., or in a dusty place.
This may cause fire and/or electric shock.

⊘ • **Do not allow children to play with the packaging boxes, packaging bags, or other materials.**
Failing to do so may result in injury or suffocation.

⊘ • **Do not stand on the equipment.**
Doing so could cause it to crack, break, or could result in injury.

❗ • **Ask your dealer to perform a periodical check and internal cleaning.**
Dust inside the product may cause fire and/or trouble. For check and cleaning cost, please consult your dealer.

DISCLAIMER

We disclaim any responsibility and shall be held harmless for any damages or losses incurred by the user in any of the following cases:

1. Fire, earthquake or any other act of God; acts by third parties; misuse by the user, whether intentional or accidental; use under extreme operating conditions.

2. Malfunction of non-function resulting in indirect, additional or consequential damages, including but not limited to loss of expected income and suspension of business activities.

3. Incorrect use not in compliance with instructions in this instruction manual.

4. Malfunctions resulting from misconnection to other equipment.

5. Repairs or modifications made by the user or caused to be made by the user and carried out by a unauthorized third party

6. Notwithstanding the foregoing, Toshiba's liabilities shall not, in any circumstances, exceed the purchase price of the product.

IMPORTANT PRECAUTIONS

COPYRIGHTS

Using surveillance cameras to record certain images, and the subsequent publication, distribution or exhibition of such images, including, but not limited to, items in art exhibits, performing arts, photographs and printed materials, may require the permission of the owners of the rights to said images, subject to copyright law or other applicable laws.

Save Original Packing Materials

The original shipping carton and packing materials will come in handy if you ever have to ship your DVR. For maximum protection, repack the set as it was originally packed at the factory.

Daily or weekly Maintenance

Please sometimes check a recorded content.

Hard disks and Fans

In order to maintain recorded content and machine itself, and to prevent troubles, replacement of hard disks and fans in 3 years is the recommendation but not guarantee.

1. PRODUCT FEATURES

1.1 Product Introduction

This DVR uses hard disk drives instead of VCR tapes to store digital video images. It enables you to enjoy the extreme flexibility of digital image archiving instead of clumsy tape management, and is absolutely compatible with most multiplexers in the market. Equipped with a wide range of comprehensive features, such as playback picture-by-picture, quick access video recording by time and event, the upgradeable software, the expandable capacities of the hard-disk drive, and much more, the DVR will make your applications far more flexible and effective than ever before. For everyone, this DVR is going to prove the timely substitute for Time-lapse VCR.

1.2 Product Features

* Stores video on hard disks instead of VCR tapes.
* Maximum 3 Hard Disks capability. (One removable)
* Hard disk hot-swapping capability
* Pre-alarm image recording
* Capable of working with various known multiplexers.
* Time-lapse and real-time recording.
* Refresh rate up to 60 FPS (50 FPS for PAL).
* Image quality selectable at 3 different levels for recording.
* Schedule/Manual/Alarm/Continuous recording mode.
* Quick search by time, alarm, event, and recording list.
* Fast and slow playback of recorded video at various speeds.
* Single-frame playback.
* On-screen main menu, title and system timer
* Password protection.
* Critical image archiving through 1.44 MB floppy drive.
* Disk-full warning and operation status LEDs.
* RS-232 communication port.
* Power interruption recovery.
* Operation-status record log.

2. DESCRIPTION OF THE FRONT/REAR VIEW

2.1 Front View

TOSHIBA DIGITAL RECORDER KV-HD01A

(1) Hard-disk drive compartment.
This compartment allows you to install a drive for backup purposes or additional storage. Make sure the drive is well secure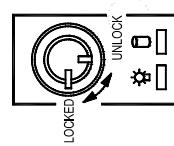d with the mounting screws in the mobile rack before you put the rack into the compartment. And remember to turn on the power of the compartment by locking it.

(2) 1.44 floppy disk drive. This 1.44 floppy disk slot is used for the system software updating and critical images archiving.

(3) Hard disk (HD3) compartment lock:
To secure a hard disk in place. Unlock this compartment before you remove the hard disk from the slot without turning off the device.

NOTE: Removable Hard Disk Drive (HD3) will not be recognized by system unless the Hard Disk Compartment Lock is turned to the "LOCKED" position.

(4) SETUP button:
Press this to enter the main menu. Press again to exit the setup mode.

(5) DISPLAY button:
Push this to show the system operation status on the screen. (Please refer to section 3.3 for details)

(6) SEARCH button:
Press this to enter the search mode for accessing recorded video.

(7) RETURN button:
Press to leave the current setup page and return to the previous page.

(8) ⟲ REV button:
Press this to play a video in the reverse direction at faster or slower speeds than the recorded speed. Each subsequent press of the REV button increases or slows the rate.

(9) ▸ PLAY button:
Press to play back a recorded video from the hard disk. While playing back the recorded video at faster or slower speeds than the recorded speed, press this button to return to the regular playback speed.

(10) ■ STOP button:
Press this to stop playing back a recorded video.

(11) FWD button:
Press this to play a recorded video in the forward direction at faster or slower speeds than the recorded speed. Each subsequent press of the FWD button increases or slows the rate.

(12) PAUSE / STEP button:
In a playback display, press this to freeze the display. During the freeze, press this to display one frame/field of a picture at a time in the forward direction.

(13) REC button:
Push this to start recording the video into hard disks while in the live display mode.

(14) ✳MUX / ●DVR button:
When connected to a multiplexer, press the MUX/DVR button to switch between the multiplexer decoded video and the encoded video to be displayed. When the button light is on it indicates the DVR is displaying the decoded video (The pictures are not multiplexing). In this mode, the unit doesn't display the OSD message of the unit on the screen. However, it doesn't affect the DVR's OSD message that is recorded into hard-disk drive. When the button light is off it indicates the DVR is displaying encoded video (The picture is switching swiftly).

(15)(16) ◁|▷ Right / Left buttons:
Press these two buttons to highlight desired items in the menu setup mode. For **Key Lock** operation, simultaneously press these two buttons once to lock the unit; to release **Key Lock**, simultaneously press these two buttons again.

(17)(18) △▽ Up / Down buttons:
Press these two buttons to select the desired contents for programming in the menu setup mode.

(19) ENTER/SAVE Button:
Press to enter the selected item and save the setting in the menu setup mode. During the playback of a video, if you wish to save a specific image to a floppy disk, press the PAUSE button to freeze the picture first and then press this button to save the image to a floppy disk.

(20) Indicator of Alarm Recording Mode:
When the scheduled record setting is on, the indicator will light.

(21) Indicator of Timer Recording Mode:
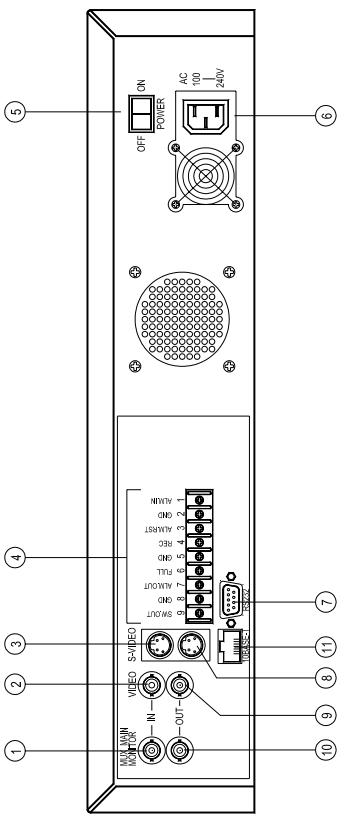When the alarm record setting is on, the indicator will light.

(22) Indicator of Hard Disk Status:
Indicates the operation status of the hard-disk drives. Green light indicates the hard-disk drive is storing or retrieving the data. Red light signals the hard disk is reaching capacity.
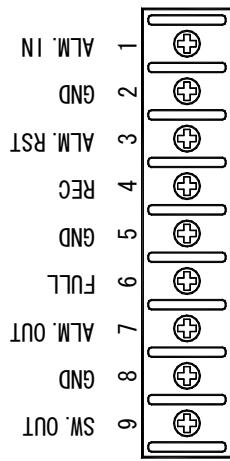
(23) Power Indicator:
Indicates the power status of the DVR.

2.2 Rear View

(1) **MUX MAIN MONITOR IN** Connector:

This BNC connector is used to connect the live video output from a multiplexer to the unit.

(2) **VIDEO IN** Connector:

This BNC connector is used to connect the video output from a camera or a multiplexer to the unit.

(3) **S-VIDEO IN** Connector:

This connector is used to connect the S-video output from a camera or a multiplexer to the unit.

(4) **Terminal Block:**

There are 9 exposure contacts on this terminal block including **SW. Out, GND, ALM. OUT, FULL, REC, ALM RST, GND,** and **ALM. IN** for connecting with external devices. Please refer to the next section for details.

(5) **Power Switch:**

To power the unit on or off.

(6) **Plug Outlet:**

For connecting with an external power supply.

(7) **RS-232** Port:

RS-232 communication port for connecting with an external control device. Please refer to APPENDIX 1 for more details.

(8) **S-VIDEO OUT** Connector:

This provides a S-video signal to a multiplexer.

(9) **VIDEO OUT** Connector:

This provides a composite video signal to a multiplexer.

(10) **MONITOR** Connector:

This provides a composite video or a multiplexer's live signal if connected to a display device.

(11) **10 BASE-T** Connector:

This is a standard RJ-45 connector for 10 Mbps Ethernet networks.

NOTE: The DVR only processes the S-VIDEO IN signal when receiving video signals simultaneously from both "S-VIDEO IN ③" and "VIDEO IN ②" connectors.

2.3 Terminal Block

1. **ALM IN: (INPUT)**

This is an alarm input, which can be programmed in the menu system to Normally Open or Normally Closed. (Active low, 5V)

2. **GND:**

Ground Contact.

3. **ALM RST: (INPUT)**

This terminal connects to an alarm-clear device for clearing the alarm. (Active low, 5V)

4. **REC: (INPUT)**

This terminal connects an external switch to turn the recording function of the DVR on/off. (Active low, 5V)

5. **GND:**

Ground Contact.

6. **FULL: (OUTPUT)**

This terminal sends out the full-disk signal. (Active low, 5V)

7. **ALM OUT: (OUTPUT)**

This is an alarm output relay. Connect this to an external device like buzzers or lights. (Active low, 5V)

8. **GND:**

Ground Contact.

9. **SW OUT: (OUTPUT)**

This terminal, sending out the timing signal (falling/negative) to a multiplexer. Connect this terminal to a multiplexer's trigger terminal so that the multiplexer can switch to use the same recording speed as the DVR.
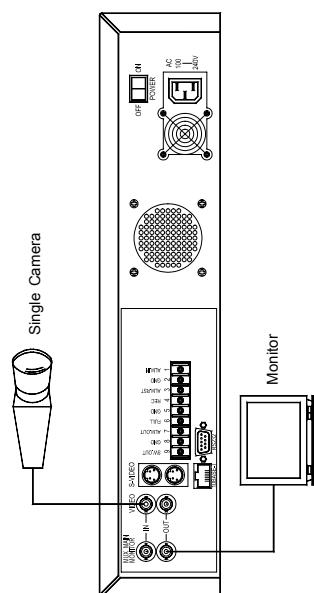
3. INSTALLATION

3.1 Basic Connection

CONNECTING WITH A SINGLE CAMERA (OR A QUAD PROCESSOR)

Please set the **MULTIPLEXER** option to **OFF** on the **REC Setting page** in the main menu. (Please refer to section 5.3 MULTIPLEXER option)

CONNECTING WITH A MULTIPLEXER

To match the multiplexer's recording speed, please set the **MULTIPLEXER** option to **ON** on the **REC Setting page** in the main menu when the DVR is connected with a multiplexer. (Please refer to section 5.3 MULTIPLEXER option)

When a Toshiba's Multiplexer (JK-MX16A) is connected, you can add a RS-232 connection to synchronize the operation mode between the DVR and the MUX. The MUX will automatically switch between live or playback mode in corresponding to the state of the DVR. Follow the instructions below to establish the connection.

1. Connect the DVR with the multiplexer with a null modem cable. (For the details of pin configuration of RS-232 please refer to 1. Setup, Appendix 1)

2. Set the RS-232 option to MASTER in the COMMUNICATION page of the main menu. Select a communication baud rate for MUX except **Remote**.

NOTE: The DVR only processes the S-VIDEO IN signal when receiving video signals simultaneously from both "S-VIDEO IN ①" and "VIDEO IN ②" connectors.

3.2 System Information

You can display system settings information as shown on **Table 3.2 A** below at any time by pressing the **DISPLAY** button🔲. However, when the unit is displaying a decoded image from a multiplexer, you must first switch the unit to encoded image displaying (The pictures is switching swiftly and the light of✱**MUX/●DVR** button🔲 is off) by pressing the✱**MUX/●DVR** button🔲. Each sequential press of the **DISPLAY** button displays a different message detailed in the following example. By default, the unit displays time, date, and an indicating bar of capacity status on a monitor as shown next.

Default display

(Capacity Used)   (Capacity Remaining)

09- 05-2001	16:13:02
(Date)	(System Time)

Press the **DISPLAY** button once; the unit will display the following sample message plus the default display. Press the **DISPLAY** button again; the unit will not display any OSD message. Press the button one more time to back to the default display.

Table 3.2 A.

HD 1+HD 2: 76G	11.2 HR	📼	
QUALITY: HIGH		NTSC	
RATE: 6 HR		20 F/S	
HD	P	SIZE	POS
1	Y	38 G	2.5%R (P)
2	Y	38 G	0%R (P)
3	.	.	.

Description of Table 3.2 A

(HD1+HD2: 76GB): Total capacity of installed hard disk, 76 GB

(11.2 HR): Total 11.2 hour minimum guaranteed recording time available.   Actual recording time may be longer in everyday use.

( ): Timer record activated

( ): Alarm record activated

(QUALITY: HIGH): Record quality setting, HIGH

(NTSC): NTSC system

(RATE: 6 HR): Setting of Record time mode, 6 hours

(20 F/S): Record speed setting, 20 fields/sec

(HD): Hard disk Compartment

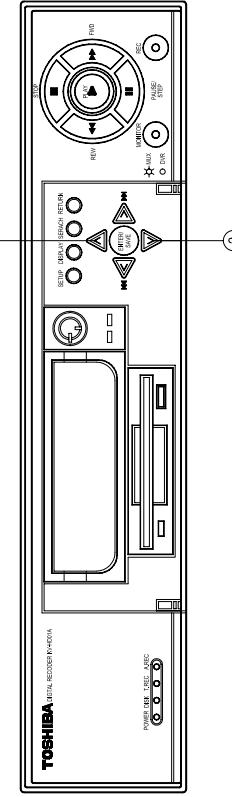**(P)**: Y Hard disk installed; . No hard disk installed

(SIZE 38GB): The capacity of the installed hard disk

POS: Percentage of system; **R:** Recording; **P:** Playback

3.3 Updating System Software

If the system software of the unit needs to be upgraded, please take the following steps to safely update it.

Important: Before carrying out the following procedures, please ensure the floppy disk is working and the file of system software is intact (The size of the file should be up to 170 K.)

1. Turn off the unit.

2. Insert the floppy disk into the built-in floppy drive of the unit.

3. Hold down the △ and ▽ buttons simultaneously, and then turn on the unit.

4. Keep holding down the buttons until the unit sounds a tone and display the message " **SOFTWARE UPDATE**" and an indicating percentage of proceeding against a blue background on the screen. Now the unit is updating the system software, which will take approximately 90 seconds to process.

5. Restart the unit when the device sounds a tone twice and displays the message " **PLEASE RESTART**". The process is complete.
    (If you have already followed the procedure 1~5, the unit, however, is not being able to power on. Please first check if the floppy disk you are using is functioning and the file is intact. And then start the procedure 1 ~ 5 all over again.)

6. Verify the version of system software by entering main menu and then press △ and pause ◁ ; buttons at the same time.

Warning: Don't interrupt the process while the unit is updating itself and proceed with a floppy disk containing with no system software of the unit, which would cause the unit hang on.

3.4 Video format (NTSC/PAL) selection

If the video format (NTSC/PAL) of the unit needs to be changed, pleases take the following steps.

If the unit is currently set to NTSC;

1, Push stop ⊙ button.

2, Hold down the ▽ and pause ⟨⟩ buttons simultaneously.

3, OSD massage "SET PAL, PLS RESTART" appears.

4, Restart the unit.   The video format is now set to PAL.

To revert back to NTSC, repeat process.

Note: Video recorded in PAL format will not playback on NTSC setting. Likewise video recorded in NTSC will not playback on PAL setting. It is recommended to reformat HDD after changing video format.
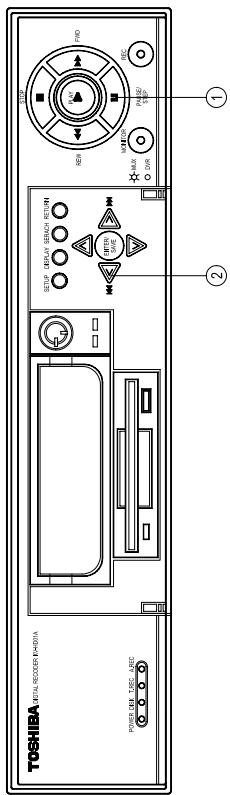
1-8

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4. BASIC OPERATIONS

This section shows you how to operate and manage the unit when it gets in the way.

4.1 Configuring Recording Settings

Recording Time settings (Recording Rate and Picture Quality Setting)

Recording time will vary depending on the image size, recording rate, and the capacity of hard-disk drive.

This unit ships with a 80GB hard disk for continuous recording from one to eight weeks under most recording conditions. The table below shows recording times based on the 80GB hard-disk drive at certain refresh rates and the corresponding image quality. With one or more hard-disk drives in operation, please calculate the recording time using the table below in accordance with your requirements. For a NTSC unit, for example, if the unit is set to record images with **HIGH** quality at a **60 fps** record rate, normally a 80GB hard-disk drive will be filled in 12 hours (See the gray area in the table). In a 2nd 80GB hard disk drive is added, under the same refresh rate and picture quality, both drives will be filled in 24 hours.

Set up the REC Time Mode when a multiplexer is connected

For optimum image recording and playback when a Multiplexer is used, the record speed of the multiplexer must be correctly adjusted to match the unit. Set the **MULTIPLEXER** option on the main menu to **ON**. This can be done one of the two methods detailed below.

(1) If an Toshiba multiplexer is connected for use, you can program the REC time mode of the multiplexer by referring to the table below (each refresh rate refers to one REC time mode).

(2) For a multiplexer other than Toshiba. Please, connect the SW. OUT terminal on the rear panel of the DVR to the multiplexer's trigger contact. The DVR will provide the timing signal (Negative/Falling) to the multiplexer. Thus, if the DVR changes the recording speed, the multiplexer will automatically adjust the record to match. The DVR doesn't provide a 2-hour timing signal in NTSC or 3-hour timing signal in PAL.

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NTSC System

Refresh Rate (Field/Sec)		60	20	10	5	2.5	1.25	0.625	0.25	0.16	0.125
		Possible Recording Time HDD=80 Gigabytes									
Image Quality	HIGH	12 hr	36 hr	72 hr	144 hr	288 hr	576 hr	1008 hr	2880 hr	4320 hr	5760 hr
	STANDARD	18 hr	54 hr	108 hr	216 hr	432 hr	864 hr	1512 hr	4320 hr	6480 hr	8640 hr
	BASIC	24 hr	72 hr	144 hr	288 hr	576 hr	1152 hr	2016 hr	5760 hr	8640 hr	11520 hr
REC Time Mode		2 hr	6 hr	12 hr	24 hr	48 hr	96 hr	168 hr	480 hr	720 hr	960 hr
REC interval (1/60 sec)		1	3	6	12	24	48	84	240	360	480

PAL System (For using with single camera)

Refresh Rate (Field/Sec)		50	25	12.5	6.25	3.13	1.56	0.89	0.31	0.21	0.16
		Possible Recording Time HDD=80 Gigabytes										
Image Quality	HIGH	14 hr	28 hr	54 hr	112 hr	224 hr	448 hr	784 hr	2240 hr	3360 hr	4480 hr
	STANDARD	22 hr	44 hr	88 hr	176 hr	352 hr	704 hr	1232 hr	3520 hr	5280 hr	7040 hr
	BASIC	28 hr	56 hr	112 hr	224 hr	448 hr	896 hr	1568 hr	4480 hr	6720 hr	8960 hr
REC Time Mode		3 hr	6 hr	12 hr	24 hr	48 hr	96 hr	168 hr	480 hr	720 hr	960 hr
REC Interval (1/50 sec)		1	2	4	8	17	32	57	161	241	321

PAL System (For using with a multiplexer)

Image Quality		3.5 hr	10.5hr	24.5hr	38.5hr	73.5hr	143.5hr	248.5hr	703.5hr	1053.5hr	1403.5hr
		Possible Recording Time HDD=20 Gigabytes										
	High	3.5 hr	10.5hr	24.5hr	38.5hr	73.5hr	143.5hr	248.5hr	703.5hr	1053.5hr	1403.5hr
	Standard	5.5 hr	15.8hr	36.8hr	57.8hr	110.3hr	215.3hr	372.8hr	1055.3hr	1580.3hr	2105.3hr
	Basic	7 hr	21.0hr	49.0hr	77.0hr	147.0hr	287.0hr	497.0hr	1407.0hr	2107.0hr	2807.0hr
Refresh Rate (Field/Sec) (Figures on the setup menu)		50 (50)	16.7 (25)	7.14 (12.5)	4.55 (6.25)	2.38 (3.13)	1.22 (1.56)	0.70 (0.89)	0.25 (0.31)	0.17 (0.21)	0.12 (0.16)
REC Time Mode		3 hr	6 hr	12 hr	24 hr	48 hr	96 hr	168 hr	480 hr	720 hr	960 hr

NOTE:: Recording times on the tables above are estimated. For actual available recording time of a recording configuration, please refer to the system information of the DVR. (Please refer to section 3.3 system information for more details.)

4.2 Recording Operations

This section details the way to record video into hard-disk drives. Before commencing with the recording function, please configure the recording setting properly according to your needs.

4.2.1 Manual Recording

When the unit is in the live display mode, take the following steps to start recording:

(1) In live display, press the **REC** button 🔘 to record video onto a hard disk drive with the corresponding programmed recording settings. The monitor should display a flashing **REC** message and the **REC** button will light up indicating the unit is in the recording status.

(2) Press the 🔘**STOP** button 🔘 to stop recording any time.

(3) To access just recorded video, please refer to section 4.4 for more details.

4.2.2 Timer Recording

Timer recording provides two periods of time each day in a weekly table which programs the DVR to turn on and off at specified times. This way the DVR will start and stop recording according to the programmed schedule. Please take the following steps to program the scheduled recording.

(1) Press the **SETUP** button 🔘 to enter the **MAIN MENU**.

(2) Select the **RECORD TIMER** and press the **ENTER/SAVE** button 🔘 to enter the **TIMER** page.

(3) Select the **TIMER-SET**.

(4) Press the 🔘 **ENTER/SAVE** button 🔘 to enter the **REC SCHEDULE** table.

(5) Use the ◁ button 🔘 and the ▷ button 🔘 to locate the specific day/hour/minute and use the △ button 🔘 and the ▽ button 🔘 to set the day/hour/minute you wish. The time is displayed in a 24-hour clock format.

(6) After scheduling is completed, press the 🔘 **ENTER/SAVE** button 🔘 and set **OK** to save the setting or select **CANCEL** to leave the page without saving the settings.

(7) To activate the programmed recording schedule, set the **REC ENABLE** to **ON**. As the scheduled recording is on, the red indicator of the Timer Record will be on as well. To deactivate it, set to **OFF**.

(8) Press the 🔘 **STOP** button 🔘 during the scheduled recording to stop it at any time. If you wish to continue the scheduled recording, press the **REC** button 🔘 to proceed.

NOTE: You can proceed to start the scheduled recording from the current time if it is in the scheduled interlude as soon as setting is completed. Press the REC button to proceed.

NOTE: If you activate the recording function before the scheduled recording, the unit will operate recording as showed the diagram below and keep those Image in different files.

	START	END		START	END		
03:00	06:00	08:00		12:00	14:00		

Start Manual Recording   Timer   Manual   Timer   Manual

4.2.3 Alarm Recording

Take the following steps to activate the programmed alarm recording. For **ALM REC RATE**, **ALM REC QUALITY**, **ALARM STATUS**, **ALM DURATION**, and **PRE-ALARM** settings, please refer to section 5.4 for more details.

(1) Press the **SETUP** button [icon] to enter the **MAIN MENU**.

(2) Select **ALARM** and press the [icon] **ENTER/SAVE** button [icon] to enter the **ALARM SETTING**.

(3) Set the desired **REC RATE**, **REC QUALITY**, **ALM TYPE**, and **ALM DURATION** for use. If pre-alarm recording is required, set **PRE-ALARM** to **ON**.

(4) To activate the alarm recording, set **ALARM OPERATION** to **ON**. To deactivate it, set **ALARM OPERATION** to **OFF**.

```
              MAIN MENU


  TIME/ TITLE
  RECORD TIMER
  RECORD
  ALARM
  COMMUNICATION
  DISK
  SYSTEM

  GO TO ALARM   PAGE
```

```
              ALARM SETTING

  ALM OPERATION      : OFF
  REC RATE           : 60F/S
  REC QUALITY        : HIGH
  ALM TYPE           : NO
  ALM DURATION       : NON STOP
  PRE- ALARM         : OFF

  MAIN   PAGE
  ALARM REC ENABLE
```
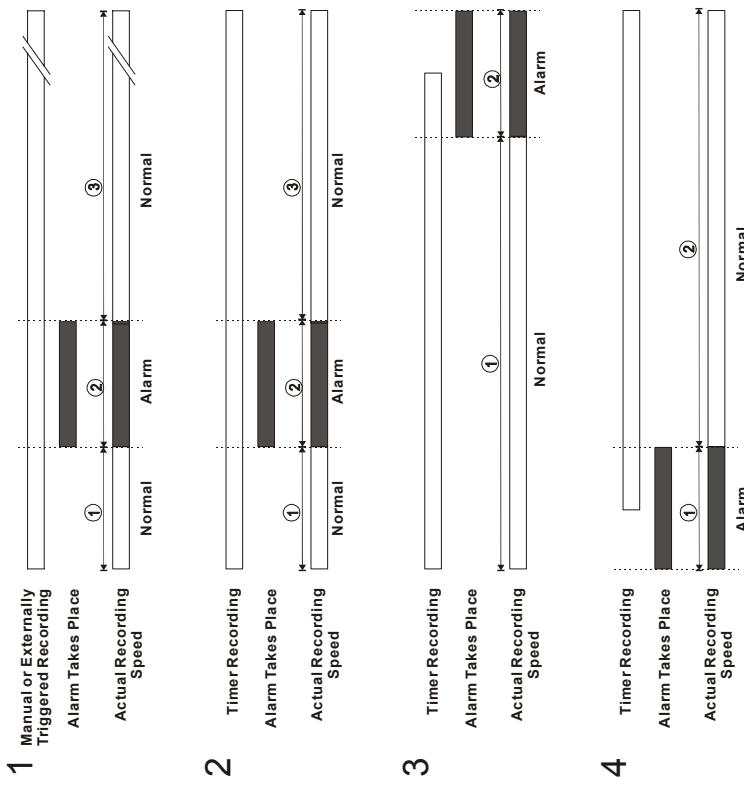
4.2.4 Externally triggered Recording

You can use an external switch to turn the recording function of the DVR on/off to record video into the hard-disk drive by connecting the **REC** exposure contact on the rear panel of the DVR. Please refer to section 2.3 for more details.

```
              MAIN MENU


  TIME/ TITLE
  RECORD TIMER
  RECORD
  ALARM
  COMMUNICATION
  DISK
  SYSTEM

  GO TO TIMER PAGE
```

```
              RECORD TIMER


  REC ENABLE--------------ON
  TIMER



  MAIN   PAGE

  TIMER REC ENABLE
```

```
              MAIN MENU


  TIME/ TITLE
  RECORD TIMER
  RECORD
  ALARM
  COMMUNICATION
  DISK
  SYSTEM

  GO TO TIMER PAGE
```

```
              RECORD TIMER


  REC ENABLE
  TIMER--------------SET



  MAIN   PAGE

  SET REC TIMER
```

```
              REC SCHEDULE

  START END         START END
  S : 00-00:00-00   00:00-00:00
  M: 00-00:00-00    00:00-00:00
  T : 00-00:00-00   00:00-00:00
  W: 00-00:00-00    00:00-00:00
  T : 00-00:00-00   00:00-00:00
  F : 00-00:00-00   00:00-00:00
  S : 00-00:00-00   00:00-00:00
  ←→  TO MOVE       ↑↓ TO CHANGE
```

1-10

NOTE: The status of recording operations as showed the diagrams below when an alarm takes place.

1 Manual or Externally Triggered Recording
Alarm Takes Place
Actual Recording Speed
Normal ① Alarm ② Normal ③

2 Timer Recording
Alarm Takes Place
Actual Recording Speed
Normal ① Alarm ② Normal ③

3 Timer Recording
Alarm Takes Place
Actual Recording Speed
Normal ① Alarm ②

4 Timer Recording
Alarm Takes Place
Actual Recording Speed
Alarm ① Normal ②

4.3 Playback Operations

This section shows you how to operate the fast, slow, and single-picture playback functions, and details how the unit is to playback a file in different operation status. Please refer to the following paragraphs specifying the relevant details. When playing a file, the monitor should display a flashing **PLAY** message and the ⊙ **PLAY** button will light up indicating that the unit is in the playback status.

Operation Status

A. From REC mode to Playback mode

(In live mode, directly press "PLAY" button to play a latest recorded video)

REC→ [Stop] → [Play] .... Play the latest recorded file
[Play: to the end of the file]   Show the ending message
(Using search function to replay the file if required)
[Stop] → [Play] .... Play the file from the stop position

B. Search to play back a particular recorded video

Search→ [Play] .... Play a selected file
[Play to the end of the file] .... Show the ending message
(Search again to replay the file if required)
[Stop] → [Play] .... Play the file from the stop position

C. Play Back From The Oldest Data

[Stop: Press the "STOP" button for three seconds] → [Play] .... play back the oldest recorded video

4.3.1 Fast Forward/Reverse

There are 5 speeds available for playback: 2x, 4x, 8x, 16x, and 30x.

While playing back recorded video at recorded speed:

Forward: Press the ⊗ **FWD** button to view the recorded video in the forward direction at a speed faster than the recorded speed. Each subsequent press of the ⊗ FWD button increases the rate.

Reverse: Press the ⊗ **REV** button to view the recorded video in the reverse direction at a speed faster than the recorded speed. Each subsequent press of the ⊗ **REV** button increases the rate.

Normal: Press the ⊙ **PLAY** button to return to the normal speed of playback.

NOTE: The playback speed will be displayed on the screen. However, when playing a recorded video from a multiplexer, the playback speed only display on encoding (multiplexing) mode.

Press the ✳MUX / ●DVR button to switch between decoding and encoding mode.

4.3.2 Slow Forward/Reverse

There are 4 speeds available for a slow playback: 1/2, 1/4, 1/8, 1/16. Follow the instructions below to proceed with a slow playback.

While playing back recorded video at the recorded speed:

(1) Press the 🕐 **PAUSE/STEP** button 🎛 for the slow playback mode.

(2) **Forward:** Press the 🕐 **FWD** button 🎛 to view the recorded video in the forward direction at a speed faster than the recorded speed. Each subsequent press of the **FWD** button slows the rate.

(3) **Reverse:** Press the 🕐 **REV** button 🎛 to view the recorded video in the reverse direction at a speed faster than the recorded speed. Each subsequent press of the **REV** button slows the rate.

(4) **Normal:** Press the 🕐 **PLAY** button 🎛 to return to the normal speed of playback.

4.3.3 Play Back Picture-by-picture

While playing back recorded video at the recorded speed:

(1) Press the 🕐 **PAUSE/STEP** button 🎛 for the picture-by-picture mode.

(2) Press the 🕐 **PAUSE/STEP** button 🎛 to display one frame/field of a picture at a time in the forward direction. **(When playing back recorded video recorded by a multiplexer, each sequential press of the 🕐 PAUSE/STEP button 🎛 will display each camera in sequence.)**

(3) Press the 🕐 **PLAY** button 🎛 to return to the normal speed of playback.

NOTE: A flickering condition of an image occurs while playing back picture-by-picture, please set the FLICKER REDUCTION option to ON in the SYSTEM page of the main menu. However, when this function is activated, a slight loss of picture quality may occur.

4.3.4 Play Back Recorded Video from a HDD of the mobile rack

To play back a recorded video from a HD3, take the following steps:

(1) Press setup button to enter the main menu.

(2) Select **DISK** and press the 🔘 **ENTER/SAVE** 🎛 button to enter **DISK SETTING** page.

(3) Set the **HD3 USAGE** to **REC/PLAY** and then exit the main menu.

(4) Use the Search function to access desired recorded video. Specific operation details please refer to next section 4.4 Search Operations.

4.4 Search Operations

This section shows you how to access recorded video.

4.4.1 Full List Search

Take the following steps to proceed with the full list search function.

(1) Press the **SEARCH** button 🎛 to enter the search mode.

(2) Select the **FULL LIST** and press the 🔘 **ENTER/SAVE** 🎛 button to access the complete list of recorded video.

(3) Highlight the specific recorded video of your requirement and press the 🔘 **ENTER/SAVE** button 🎛 to display the selected video.

(Key Operation: Press △▽ Up/Down buttons 🎛🎛 to select a video; Press ◁▷ Right / Left buttons 🎛🎛 to flip over a page.)

```
              HD 1
         2001-02-01 12: 20
      A  2001-02-01 13:30
         2001-03-02 14:20
      R  2001-03-02 14:20
              HD 2
      T  2001-02-01 13:30
```

⬆

```
     SEARECH
     FULL LIST
     ALARM LIST
     TIME SEARCH
```

NOTE: **T: Timer recording; R: External trigger recording; A: Alarm recording.**

4.5 Data Backup

4.5.1 Backup Operations

There are three ways available to duplicate the recorded video from HD 1 and HD 2 to HD 3. Please take the following steps to proceed.

(1) Set HD 3 to BACKUP first. Take the following steps.

● Press the **SETUP** button to enter the setup mode and select the **DISK**.

● Highlight **DISK** and press the **ENTER/SAVE** button to enter the **DISK SETTING** page.

● Then set **HD 3 USAGE** to **BACKUP**.

```
MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM

GO TO DISK   PAGE
```

```
DISK SETTING

REFORMAT          HD 1
HD 3 USAGE-------- BACKUP
BACKUP            REC/PLAY

MAIN    PAGE

SET HD 3 USAGE
```

(2) FULL: Duplicating all the recorded video from HD1 and HD 2 to HD3.

● Stay on the **DISK SETTING** page.

● Use the △▽ **Up/Down** buttons to highlight **BACKUP**; select **FULL**, then press the **ENTER/SAVE** button to proceed.

```
MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM

GO TO DISK PAGE
```

```
DISK SETTING

REFORMAT
HD 3 USAGE
BACKUP-------- FULL
              ALARM
              SELECT

MAIN    PAGE

BACKUP ALL TO HD 3
```

4.4.2 Alarm list Search

Take the following steps to proceed with the alarm list search function.

(1) Press the **SEARCH** button to enter the search mode.

(2) Select the **ALARM LIST** and press the **ENTER/SAVE** button to access the complete list of alarm-event recorded video.

(3) Highlight the specific recorded video of your requirement and press the **ENTER/SAVE** button to display the selected video.

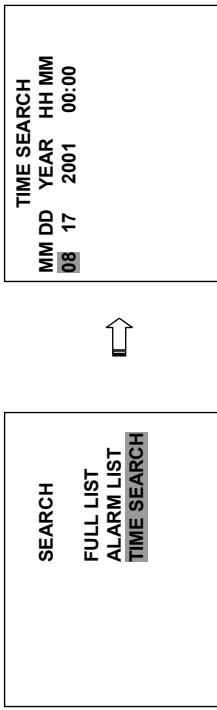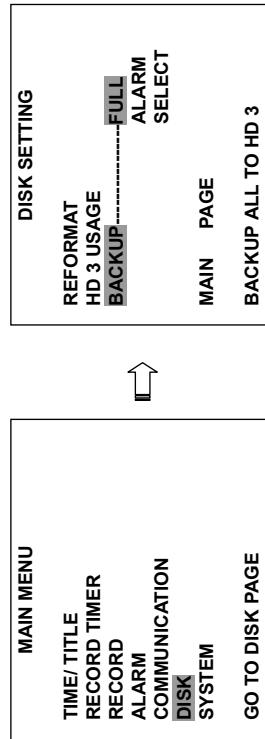**(Key Operation: Press △▽ Up/Down buttons to select a video; Press ◁ ▷ Right / Left buttons to flip over a page)**

```
SEARCH

FULL LIST
ALARM LIST
TIME SEARCH
```

```
A 2001-02-01 12: 20
A 2001-02-01 13:30
A 2001-03-02 14:20
```

4.4.3 Time Search

Take the following steps to proceed with the alarm list search function.

(1) Press the **SEARCH** button to enter the search mode.

(2) Select the **TIME SEARCH** and press the **ENTER/SAVE** button to access the time setting page.

(3) Set the time period you wish to search for the recorded video.

(4) Press the **ENTER/SAVE** button to start searching and displaying the concerned image.

(5) If no video is found, please return to the time setting page and repeat steps (3) and (4) again for another search.
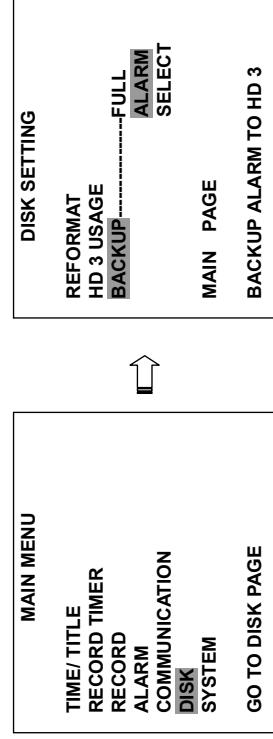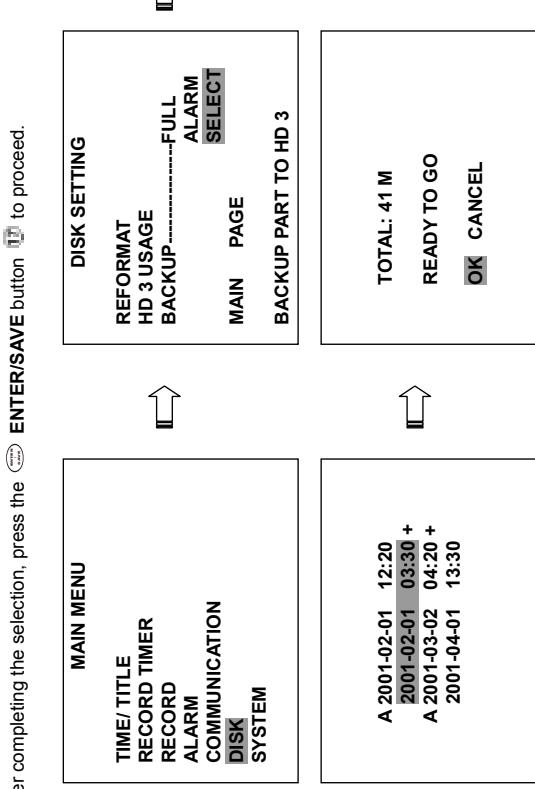
```
SEARCH

FULL LIST
ALARM LIST
TIME SEARCH
```

```
TIME SEARCH

MM DD  YEAR  HH MM
08  17  2001   00:00
```

4.5.2 Archive Clips into Floppy Disk

Please take the following steps to archive a critical image in a floppy disk.
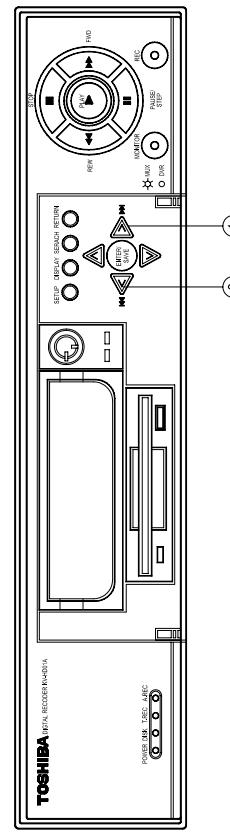
(1) Insert a 1.44 floppy disk into the floppy slot.

(2) Start playing back the recorded video. (When playing back recorded video made by a multiplexer, you must to get into the multiplexing mode and display picture by picture to be able to select the desired image for archiving. Press the **✱MUX/●DVR button** 🔟 to get into the multiplexing mode under this mode that the light of **✱MUX/●DVR** button is off and the pictures is switching swiftly)

(3) Press the 〰 **PAUSE/STEP** button 🔟 to freeze the desired pictures.

(4) Press the 〰 **ENTER/SAVE** button 🔟 to save the image in the floppy disk.

(5) A floppy disk can store approximately 50~100 pictures. You can have the saved images printed out in any computer. The image is stored in the JPEG compressed format. If more than one clip is stored in a floppy disk, file names will be assigned in sequence as shown below.

SAVE TO J0001.JPG

SAVE TO J0002.JPG

...

SAVE TO J000N.JPG

4.6 Key Lock Operation

The Key lock operation protects the unit against unauthorized use by disabling the entire front panel control. Simultaneously press these two 🔟◁ and 🔟▷ buttons (as shown below) once to lock the unit; to release **Key Lock**, simultaneously press these two buttons again.

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ALARM: Duplicating all the alarm-event recorded video from HD 1 and HD 2 to HD 3.

● Stay on the **DISK SETTING** page.

● Use the △▽ **Up/Down** buttons 🔟🔟 to highlight **BACKUP**; select **ALARM,** then press the 〰

ENTER/SAVE button 🔟 to proceed.

MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM

GO TO DISK PAGE

DISK SETTING

REFORMAT
HD 3 USAGE
BACKUP————FULL
 ALARM
 SELECT

MAIN   PAGE

BACKUP ALARM TO HD 3

SELECT: Duplicating a particular recorded video from HD1 and HD 2 to HD3.

● Stay on the **DISK SETTING** page.

● Use the △▽ **Up/Down** buttons 🔟🔟 to highlight **BACKUP,** select **SELECT** and then press the 〰

ENTER/SAVE button 🔟 to list all the recorded video.

● Press the △▽ **Up/Down** buttons 🔟🔟 to select the desired clip and press the **SETUP** button to mark it.

● After completing the selection, press the 〰 **ENTER/SAVE** button 🔟 to proceed.

MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM

A 2001-02-01 12:20
2001-02-01 03:30 +
A 2001-03-02 04:20 +
2001-04-01 13:30

DISK SETTING

REFORMAT
HD 3 USAGE
BACKUP————FULL
 ALARM
 SELECT

MAIN   PAGE

BACKUP PART TO HD 3

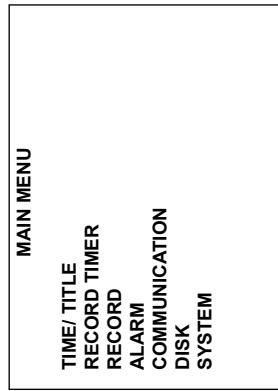TOTAL: 41 M

READY TO GO

OK CANCEL

NOTE: If the capacity of HD 3 is not sufficient to store all selected video, a warning message "HD3 SPACE NOT ENOUGH" will be displayed on the screen. Please, insert a larger capacity of hard disk drive or erase some data from the drive and start the process over again.
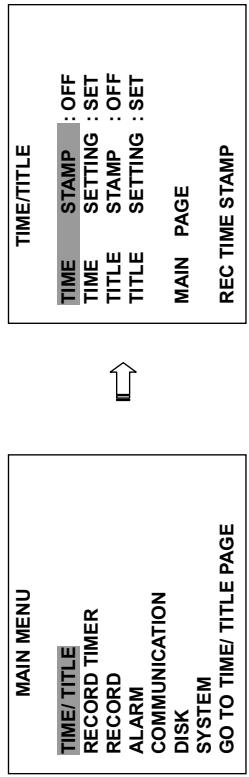
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5. MAIN MENU

There are 7 submenus to the MAIN MENU to guide you through the setup of the DVR. The following sections will instruct you step by step now to configure the operation setting and options. Press the

SETUP button ⊕ to access the MAIN MENU. Once inside the menu system, the on-screen menu allows you to set up the key features of the unit. The functions of various buttons within the Main Menu mode are described in the paragraphs below.

```
            MAIN MENU


         TIME/ TITLE
         RECORD TIMER
         RECORD
         ALARM
         COMMUNICATION
         DISK
         SYSTEM
```

KEY FUNCTIONS

SETUP button ⊕ :

Press to enter the main menu. Press again to exit the setup mode.

RETURN button ⟲ :

Press to exit the current setup page and return to the previous page.

△
▽ **Right/Left** buttons ◁ ▷ :

Press to select the desired item or entry for the setting.

◁
▷ **Up/Down** buttons △ ▽ :

Press to highlight the desired option or to select the context for the setting.

⦿ **ENTER/SAVE** button ⊡ :

Press to enter the selected item and to save the settings.

5.1 TIME/ TITLE

This device is able to print inerasable system time and title information directly onto images during recording. This page allows users to set the time and desired title, and to decide if the function is to be activated. The entries are listed as follows.

```
            MAIN MENU


         TIME/ TITLE
         RECORD TIMER
         RECORD
         ALARM
         COMMUNICATION
         DISK
         SYSTEM
         GO TO TIME/ TITLE PAGE
```

⇧

```
            TIME/TITLE


         TIME    STAMP    : OFF
         TIME    SETTING  : SET
         TITLE   STAMP    : OFF
         TITLE   SETTING  : SET

         MAIN   PAGE

         REC TIME STAMP
```

TIME STAMP :

The Time Stamp option is used to stamp the system time onto images during recording process.

The Time Stamp is inerasable.

ON : Enables the device to stamp the time onto images during recording.

OFF : Disables the stamping function.

TIME SETTING :

This option is used to set the system time and date.

TITLE STAMP :

The Title Stamp option is used to stamp the system title onto images during the recording process. The Title Stamp is inerasable.

ON : Enables the device to stamp programmed title onto images while recording.

OFF : Disables the stamping function.
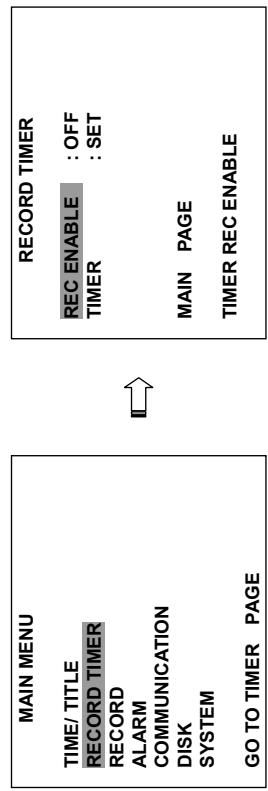
TITLE SETTING :

This option is used to set the system title. The Title can consist of up to twelve characters with the letters A-Z, numbers 0-9 or blank spaces.

NOTE: If you wish to have system-time on an archived image in a floppy, the "TIME STAMP" option must be set to "ON" for recording.

NOTE: No matter whether the "TIME STAMP" option is set to "ON" or "OFF", the unit will always encode the system time into the video while recording. So you can always have system time to be displayed on the screen by pressing the "DISPLAY" button. However, if two time messages have overlapped on the screen, please press the "DISPLAY" button to stop decoding time from the video so that the unit will only display the stamped time only.

5.2 RECORD TIMER

The unit provides a weekly table, consisting of two periods of time each day for scheduled recording. This option allows you to set the time each day that the unit will start and stop recording.
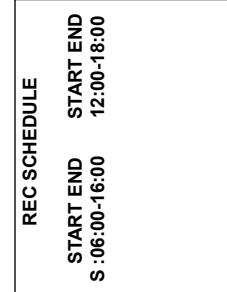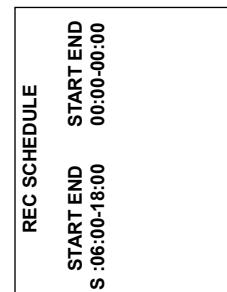
```
        MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM

GO TO TIMER   PAGE
```

⇧

```
      RECORD TIMER

REC ENABLE    : OFF
TIMER         : SET


MAIN   PAGE

TIMER REC ENABLE
```

REC ENABLE. :

The rec enable option is used to enable / disable the programmed scheduled recording.

ON: Enables the scheduled recording.

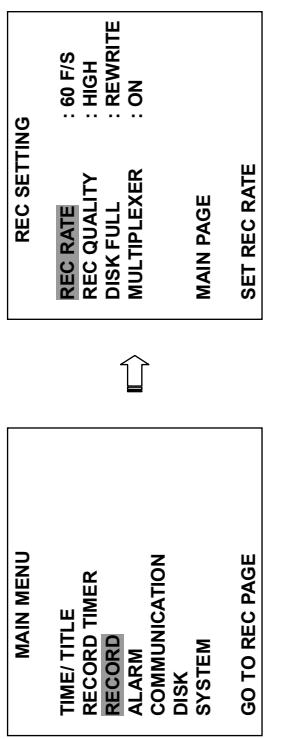**OFF:** Disables the scheduled recording.

TIMER :

This option is used to set the time that the unit will start and stop recording each day in a weekly format. There are two time periods each day available for scheduling. The time is displayed in a 24-hour clock format. If there is a time overlap between two continual time period settings, the device will automatically combine the two time-period settings into one combined time period setting.

```
    REC SCHEDULE

   START END    START END
S :06:00-16:00  12:00-18:00
```

⇧

```
    REC SCHEDULE

   START END    START END
S :06:00-18:00  00:00-00:00
```

5.3 REC SETTING

This page allows you to set recording rate and recording quality, and to enable day you to continue recording when the disk is full.

```
        MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM

GO TO REC PAGE
```

⇧

```
      REC SETTING

REC RATE      : 60 F/S
REC QUALITY   : HIGH
DISK FULL     : REWRITE
MULTIPLEXER   : ON


MAIN PAGE

SET REC RATE
```

REC RATE:

This option is used for adjusting the number of pictures recorded every second into a hard disk. The recording rate controls the frequency at which the number of video pictures can be recorded. For a NTSC unit, there are 10 different recording rates you can select from: **60F/S (60 fields per second), 20F/S, 10F/S, 5F/S, 2.5F/S, 1.25F/S, 0.625F/S, 1 F/4S, 1F/6S,** and **1F/8S.** For a PAL unit, there are two different sets of recording rates for use with a camera or a multiplexer, respectively. Please refer to the table in section 4. 1 for details.

REC QUALITY:

This option is used to determine the quality of the image being recorded. There are 3 levels of image quality you can select from: **HIGH, STANDARD,** and **BASIC.** Selecting HIGH image quality will result in higher-resolution recorded images, and will normally take up more storage space than a STANDARD or BASIC quality image does.

DISK FULL:

This option is used to determine the way to utilize storage media in the case that the specified hard disk is full.

REWRITE: When the hard disk drive is full, the device continues recording by displacing the old data.
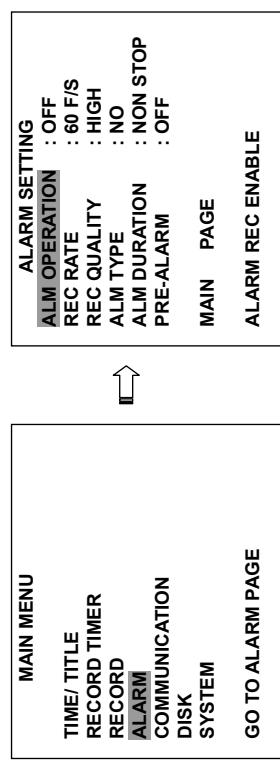
STOP: When the hard disk drive is full, the device will stop recording.

MULTIPLEXER:

For optimum image recording please set this option to **ON** when the unit connected with a multiplexer for use. Set this option to **OFF** when only it is connected with a single camera.

5.4 ALARM SETTING

This menu allows users to program the configuration of alarm recording only when an alarm input is activated. The device will record as long as the alarm input is activated.

```
            MAIN MENU                        ALARM SETTING
                                      ALM OPERATION    : OFF
 TIME/ TITLE                          REC RATE         : 60 F/S
 RECORD TIMER                         REC QUALITY      : HIGH
 RECORD                     ⇦         ALM TYPE         : NO
 ALARM                                ALM DURATION     : NON STOP
 COMMUNICATION                        PRE-ALARM        : OFF
 DISK
 SYSTEM                               MAIN    PAGE

 GO TO ALARM PAGE                     ALARM REC ENABLE
```

ALM OPERATION:

The ALM OPERATION option is used to determine whether to activate/deactivate the alarm recording when it detects an alarm input.

ON: The device activates the alarm recording when it detects an alarm input.

OFF: The device ignores the alarm signal when it detects an alarm input.

REC RATE:

The REC RATE option is used for adjusting the number of pictures recorded every second into a hard disk when an alarm input is activated. For a NTSC unit, there are 5 different record speeds you can select from: **60F/S (60 fields per second), 20F/S, 10F/S, 5F/S,** and **REMAIN.** And for a PAL unit, there are 5 different record speeds you can select from: **50F/S (50 fields per second), 25F/S, 10F/S, 6.25F/S** and **REMAIN.** If you select **REMAIN** for use, the device will record images at the same speed as set on the **REC** page.

REC QUALITY:

The REC QUALITY option is used to determine the quality of the image being recorded. There are 3 levels of image quality you can select from **HIGH, STANDARD,** and **BASIC.** Selecting **HIGH** image quality will result in higher-resolution recorded images, and will normally take up more storage space than a **STANDARD** or **BASIC** quality image does. The table below shows the level of image quality with the corresponding compression ratio and image size.
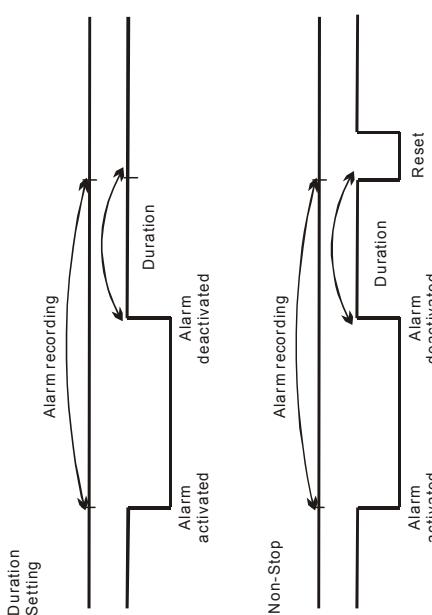
33

ALM TYPE:

The ALM TYPE option is used to set a type of alarm input corresponding to the sensor signal in use.

NO: Normally Open. This is to be used with the type of alarm sensor, whose contact remains open in normal conditions and closes in case of activation.

NC: Normally Close. This is to be used with the type of alarm sensor, whose contact remains closed in normal conditions and opens in case of activation.

ALM DURATION:

The ALM DURATION option is used to set the alarm record mode to record for a certain duration after the alarm has been deactivated. You can select one of the six following options: **0 SEC, 30SEC, 1 MIN, 5 MIN, 10 MIN,** and **NON-STOP.**

Duration Setting — Alarm recording — Alarm activated — Alarm deactivated — Duration

Non-Stop — Alarm recording — Alarm activated — Alarm deactivated — Duration — Reset
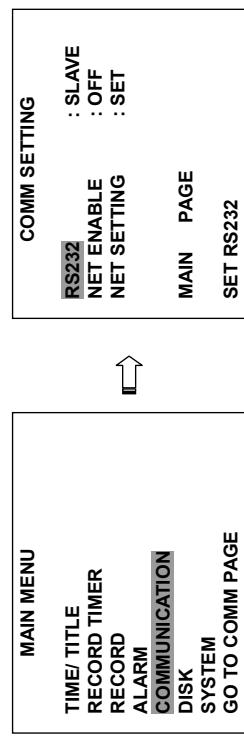
PRE- ALARM:

The PRE-ALARM option is used to determine that images prior to an alarm will be recorded into the hard-disk drive. If the alarm-recording rate is set to 60F/S, when an alarm is being triggered the device will record the image prior to the alarm for 3 seconds. If one of the other alarm-recording rates is set, the pre-alarm image recording will be extended to 5 seconds.

ON: Enables pre-alarm recording.

OFF: Disables pre-alarm recording.

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5.5 COMMUNICATION

The COMMUNICATION option is used to configure status of the communication port when the connected with an external device.

```
                    MAIN MENU

         TIME/ TITLE
         RECORD TIMER
         RECORD
         ALARM
         COMMUNICATION
         DISK
         SYSTEM
         GO TO COMM PAGE
```

⇧

```
              COMM SETTING

         RS232              : SLAVE
         NET ENABLE         : OFF
         NET SETTING        : SET

         MAIN    PAGE

         SET RS232
```

RS232:

The RS232 option is used to determine the activation/ deactivation of the RS232 communication port for externally triggered recording. To record video into the hard-disk drive connect the **REC** exposure contact on the rear panel of the DVR to the switch used to activate the alarm.

MASTER: Sets the KV-HD01A as the master device.

SLAVE: Sets the KV-HD01A as the slave device.

NET ENABLE is used to allow remote users viewing privileges over a network or IP.

OFF: Ethernet capability is turned off

ON: Ethernet capability is turned on

NET SETTING is used to set the IP, MASK, and GATEWAY address of the KV-HD01A.

SET: Sets the IP,MASK, and GATEWAY addresses of the KV-HD01A

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5.6 DISK SETTING

```
                    MAIN MENU

         TIME/ TITLE
         RECORD TIMER
         RECORD
         ALARM
         COMMUNICATION
         DISK
         SYSTEM

         GO TO DISK PAGE
```

⇧

```
              DISK SETTING

         REFORMAT          : HD 1
         HD 3 USAGE        : BACKUP
         BACKUP            : FULL


         DISK REFORMAT/CLEAR
```

REFORMAT:

The REFORMAT option is used to clear out all of the data in the hard disk drive. You will be required to enter the pre-set password before proceeding with clearing out the data. Enter the standard password "9999" if you don't set your individual password. To set your individual password, please refer to section 5.7 **PASSWORD** option.

HD 1 : Deletes all of the data stored in HD 1.

HD 2 : Deletes all of the data stored in HD 2.

HD 3 : Deletes all of the data stored in HD 3.

HD 1 2 : Deletes all of the data stored in HD 1 and HD 2.

HD 1 3 : Deletes all of the data stored in HD 1 and HD 2.

HD 1 2 3 : Deletes all of the data stored in HD 1, HD 2 and HD 3.

BACKUP HD : Deletes all of the data stored in HD 3, which is set to backup purpose only. (This function has to be proceeded when the **HD 3 USAGE** option is set to **BACKUP**.)

HD 3 USAGE:

The HD 3 USAGE option is used to determine the way to utilize the hard disk drive in the mobile compartment HD 3.

BACKUP : Used for data backup only, which will not be part of regular recording hard disk drive.

REC/ PLAY : Used for regular recording hard disk drive.

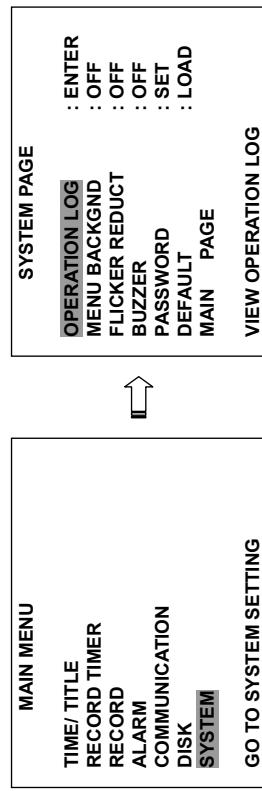**Note: When you wish to play back a recorded video from HD3, this option must be set to REC/PLAY.**

BACKUP:

The BACKUP option is used to duplicate data from HD 1 and HD 2 to HD 3.

(For operation details, please refer to section 4.5.1)

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5.7 SYSTEM

The SYSTEM PAGE is used for accessing the history of operation status, setting the password, resuming factory default, and determining the menu display background.

```
        MAIN MENU                    SYSTEM PAGE

TIME/ TITLE                  OPERATION LOG        : ENTER
RECORD TIMER                 MENU BACKGND         : OFF
RECORD                       FLICKER REDUCT       : OFF
ALARM              ⇦         BUZZER               : OFF
COMMUNICATION                PASSWORD             : SET
DISK                         DEFAULT              : LOAD
SYSTEM                       MAIN   PAGE

GO TO SYSTEM SETTING         VIEW OPERATION LOG
```

LOG :

This log shows the history of the operation status in chronological order. The operation status is described to the right of the time of each entry. There are seven possible entries as detailed below.

```
05/15/01    18:19:32 ON
05/15/01    18:19:32 OFF
05/15/01    18:19:32 REC
05/15/01    18:19:32 STOP
05/15/01    18:19:32 PLAY
05/15/01    18:19:32 PAUSE
05/15/01    18:19:32 V-IN
05/15/01    18:19:32 V-LOSS
05/15/01    18:19:32 P-LOSS
```

ON : The device was powered up.

OFF : The device was powered off.

REC : Recording Started.

STOP : Recording stopped.

PLAY : Recorded Video was played back.

PAUSE : The display was paused.

V-IN : Video input was connected.

V-LOSS : Video loss occurred.

P-LOSS : Power interruption occurred.

Note: The log keeps an operation history on a revolving basis because of a limit in memory space. When the log is full, the newly registered record of an operation will replace the existing records from the oldest one.

MENU BACKGND :

The MENU BACKGND option is used for setting the background display of the menus.

ON : Background is blue.

OFF : Background is transparent.

FLICKER REDUCTION :

The FLICKER REDUCTION option is used to eliminate the flickering condition of an image as it occurs during a playback picture by picture. Slight picture degradation may occur when using this feature.

ON : FLICKER REDUCTION is enabled.

OFF : FLICKER REDUCTION is disabled.

BUZZER :

The BUZZER option is used to determine the embedded buzzer sounding a tone to signal the following situations. A tone lasts about two seconds long.

Situation	Status
Alarm	Alarm takes place
Video Loss	Video loss takes place
Disk Full	Disk is full
Load Default	Load factory default
Buzzer	Buzzer set to ON
Key Lock	Enable/disable key lock function
HD3	Power on /off mobile rack HDD
Backup	Backup operation complete
Timer	Timer activate/deactivate
HDD	Recording switching between HDD

ON : BUZZER is enabled.

OFF : BUZZER is disabled.

PASSWORD:

The PASSWORD option is used to set a 4 digit number password to prevent any unauthorized re-formatting of the hard disk drives and to use the network viewer.

OLD PASSWORD : Enter the pre-set password (or the standard password if this is the initial setting) to access the password setting system.

NEW PASSWORD : Enter a 4 digit number password of your choosing which will replace the pre-set password (or the standard password "9999").

DEFAULT :

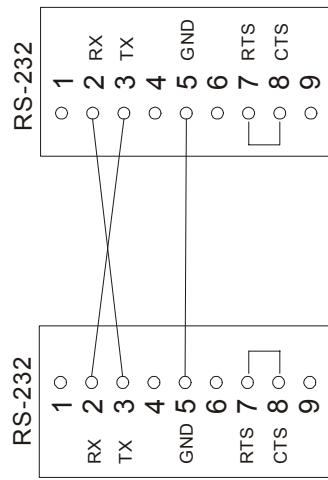The DEFAULT option is used to reload the factory default setting.

	NTSC	PAL
Image System		
Resolution	720 x 480 pixels	720 x 576 pixels
Video Input	BNC x 2, S-Video x 1	
Video Output	BNC x 2, S-Video x 1	
Storage Media	Up to 3 IDE Hard Disks (One mobile Rack)	
Image Format	M-JPEG	
Critical Image Archiving	1.44MB FDD	
Recording Rate	Up to 60 fields/sec	Up to 50 fields/sec
Image Compression	High/ Standard/ Basic	
Recording Mode	Schedule/ Manual/Alarm/Continuous	
Pre-Alarm Recording	Yes	
Playback Speeds	Fast Forward /Reverse: 1x, 2x, 4x, 8x, 16x, 30x, Slow Forward/Reverse: 1/2x, 1/4x, 1/8x, 1/16x Picture By Picture Playback	
Access To Recording	Full List Search, Time Search, and Event Search	
Title	12 Characters	
On Screen Display & Setup	Title/ Time/Date/Main Menu	
Alarm Input	1 x NO or NC Contact Programmable	
Alarm Output	Yes (5V / 0V 5mA max.)	
Full-Disk Alarm Output	Yes	
Trigger Output	1	
Operation History Log	Up to 2016 events	
Key Lock	Yes	
RS-232 port	Yes	
Software Upgradeable	Yes	
Password Control	Yes	
Power Interruption Recovery	Automatic Restart After Power Interruption /Recording Operation Resume	
Power Input	AC 100~240 V Input (50 Hz/60 Hz); 1 A Max	
Dimensions	374 x 430 x 90 mm	
Operation Temperature	5°~45°C (41°~ 113°F)	

APPENDIX 1. -- RS-232 Protocol

1.Setup

1.1 Use Null Modem cable (The standard RS-232 9 Pin Cable with Pin 2 and Pin 3 exchanged, see pin configuration chart below for details) to connect the COM 1 on the rear panel of the unit to a PC.

RS-232

1	
RX 2	
TX 3	
4	
GND 5	
6	
RTS 7	
CTS 8	
9	

RS-232

1	
2	RX
3	TX
4	
5	GND
6	
7	RTS
8	CTS
9	

1.2 Set the RS-232 option to SLAVE in the COMMUNICATION page of the main menu.

1.3 Set communication parameters: 9600 bps, No Parity, 8 Data Bits, 1 Stop Bit.

2. Communication Protocol:

2.0 General Command Format

<Lead Code = 0x41>, <Main category >, <Second category >, {<Number of parameters>, <Parameter 1>, <Parameter 2> ...} <End Code= 0x4f>

Lead Code	= 0x41	
Main Category	= 0x01	Keys and Signals
	= 0x02	Command
Second Category	= 0x01	Handshake
	= 0x02	Request Time/Set Time
	= 0x05	Request System State
End Code	= 0x4f	

The different command types and their corresponding parameters are as follows:

2.1 Keys and signals

PC Send: <0x41>, <0x01>, <Key Value>, <0x4f>

< The value for a specific front panel key >

KEY_PLAY	1
KEY_STOP	3
KEY_PAUSE	4
KEY_POWER	5
KEY_REC	6
KEY_SETUP	7
KEY_ENTER	8
SET_DEFAULT	9 (reserved)
KEY_SEARCH	10
KEY_DISPLAY	11
KEY_UP	13
KEY_DOWN	14
KEY_LEFT	15
KEY_RIGHT	16
KEY_SCAN_F	19
KEY_SCAN_R	20
KEY_RETURN	21
KEY_MONITOR	36

2.2 COMMAND Types

2.2.0 Command (Main Category=0x02)

2.2.1 Handshake (Second Category=0x01)

PC Request: <0x41>, <0x02>, <0x01>, <0x00>, <0x4f>

DVR Response: <0x41>, <0x02>, <0x01>, <0x00>, <0x4f>

2.2.2 Request Time (Second Category=0x02)

PC Request: <0x41>, <0x02>, <0x02>, <0x00>, <0x4f>

DVR Response: <0x41>, <0x02>, <0x02>, <0x07>, <7 Time Value >, <0x4f>

The following case is an illustration of **< 7 Time Value>**

2001/06/20 17:05:00 = <0xD1>, <0x07>, <0x06>, <0x14>, <0x11>, <0x05>, <0x00>

2.2.3 Set Time (Second Category=0x02)

PC Request: <0x41>, <0x02>, <0x02>, <0x07>, < 7 Time Value >, <0x4f>

The following case is an illustration of **< 7 Time Value>**

2001/06/20 17:05:00 = <0xD1>, <0x07>, <0x06>, <0x14>, <0x11>, <0x05>, <0x00>

DVR Act: Changing the time and date.

2.2.4 Set Setup Values (Second Category=0x04)

PC Request: <0x41>, <0x02>, <0x04>, <0x04>, <n+1>, <Location>, < Value 1 >, <Value 2>,....,

< Value n>, <0x4f>

For the descriptions of setup value, please see section 2.2.5.

NOTE: This command must be executed in states other than REC, Playback, and Play idle mode. (Refer to 2.2.6)

2.2.5 Request State (Second Category=0x05)

PC Request: <0x41>, <0x02>, <0x05>, <0x00>, <0x4f>

DVR Response: <0x41>, <0x02>, <0x05>, <0x01>, <System State = 0..>, <0x4f>

Description of <System State>:

STATE_STOP	0
STATE_REC	1
STATE_PREREC	2
STATE_PLAY	3
STATE_MENU	4
STATE_PLAYIDLE	5
STATE_SETUP	6..16
STATE_SEARCH	7..11
STATE_BACKUP	13..15
STATE_ALARMLIST	17
STATE_LOGLIST	18
STATE_RESTART	21

2.2.6 Time Search

PC send: <0x41>, <0x02>, <0x0b>, <0x06>, <6 Bytes Date/Time>, <0x4f> where < 6 bytes
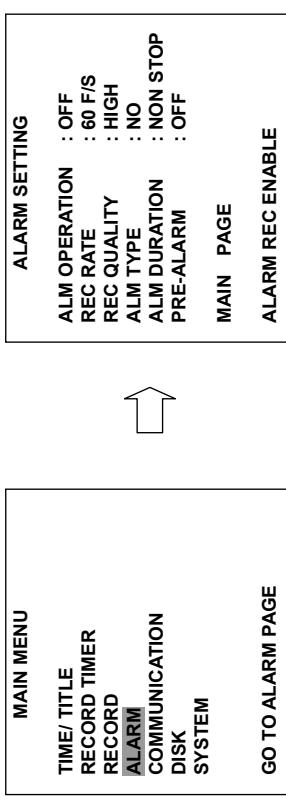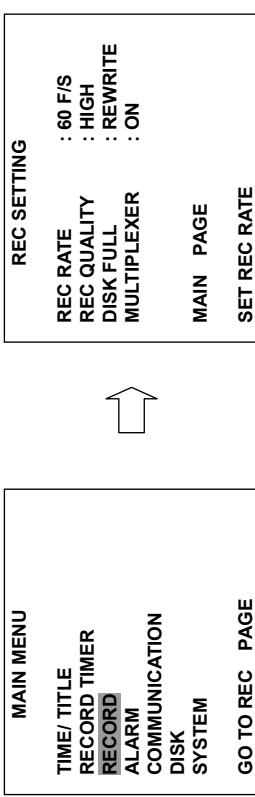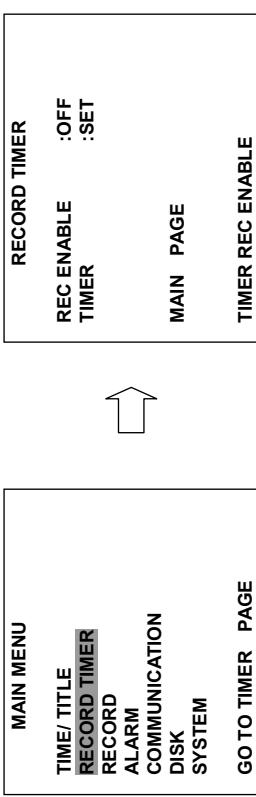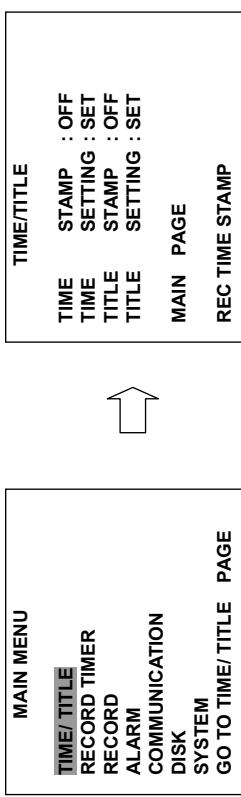
Date/Time >, = year (2 bytes, =LowByte + HighByte*256), month (1 byte), day (1 byte), hour(1 byte),min(1 byte)

Example: to search 06/12/2002 17:00 the Date/Time =

<0xd2>, <0x07><0x06>, <0x0b>, <0x11>, <0x00> where 2002= 210(=0xd2) + 7(=0x07) *256

NOTE: The DVR accepts RS-232 time search commands only under the live or playback Mode.

MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM
GO TO TIME/ TITLE PAGE

TIME/TITLE

TIME	STAMP	: OFF
TIME	SETTING	: SET
TITLE	STAMP	: OFF
TITLE	SETTING	: SET

MAIN PAGE

REC TIME STAMP

MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM
GO TO TIMER PAGE

RECORD TIMER

REC ENABLE   : OFF
TIMER   : SET

MAIN PAGE

TIMER REC ENABLE

MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM
GO TO REC PAGE

REC SETTING

REC RATE   : 60 F/S
REC QUALITY   : HIGH
DISK FULL   : REWRITE
MULTIPLEXER   : ON

MAIN PAGE

SET REC RATE

MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM

GO TO ALARM PAGE

ALARM SETTING

ALM OPERATION   : OFF
REC RATE   : 60 F/S
REC QUALITY   : HIGH
ALM TYPE   : NO
ALM DURATION   : NON STOP
PRE-ALARM   : OFF

MAIN PAGE

ALARM REC ENABLE

MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM
GO TO COMM PAGE

COMM SETTING

RS232   : SLAVE
NET ENABLE   : OFF
NET SETTING   : SET

MAIN PAGE

SET RS232

MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM
GO TO DISK PAGE

DISK SETTING

REFORMAT   : HD 1
HD 3 USAGE   : BACKUP
BACKUP   : FULL

MAIN PAGE

DISK REFORMAT/CLEAR

MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM
GO TO SYSTEM SETTING

SYSTEM PAGE

OPERATION LOG   : ENTER
MENU BACKGND   : OFF
FLICKER REDUCT   : OFF
BUZZER   : OFF
PASSWORD   : SET
DEFAULT   : LOAD
MAIN PAGE

VIEW OPERATION LOG

APPENDIX 3. -- O.S.D Message

No.	O.S.D Message	Meanings
1	NO DISK	No hard disk detected after power on
2	BATTERY LOW	Suggest user to change battery and set system time
3	LOADING	System Boot up
4	VIDEO LOSS	Video loss
5	VIDEO IN n	Video input source
6	KEY LOCKED	Key lock function is on
7	KEY UNLOCKED	Key lock function is off
8	BACKUP n1 / n2 NOW	During backup operation
9	BACKUP COMPLETE	Backup complete
10	HD3 SPACE NOT ENOUGH	HD3 has not enough space for backup
11	NO ENTRY FOR BACKUP	Nothing can be backup
12	BACKUP INCOMPLETE	Backup incomplete, since user press STOP key to stop it
13	NOT FOUND	In Time Search function, system can not find the corresponding video
14	END	Playback of recorded video reached end point
15	DISK FULL	Hard disks are full, it happened only when the DISK FULL item in main menu was set to STOP
16	EMPTY	User press PLAY key or use SEARCH function, but no video could be play.
17	SET TO NTSC, PLS RESTART	System has be set to NTSC, please reboot (PAL is similar)
18	SOFTWARE UPDATE	Software update
19	PLEASE RESTART	System should be reboot after software updated
20	NO DISK	User press save key without putting in a floppy disk, or disk error
21	DATA NOT CONTINUOUS	System finds data in installed HDs cannot be used contiguously. Suggest to remove HD2 and HD3 from system.
22	DISK ATTACHED	HD3 was attached
23	DISK REMOVED	HD3 was removed
24	DISK ERROR	HD3 detected error
25	HDn ERROR AT xxxxx	Hard disk error during recording, where n is hard disk number and xxxxx is hexadecimal location.
26	NOT PRESENT	When user try to clear a disk (in main menu) that was not attached
27	SAVE TO DISK	Start saving JPEG file
28	SAVE TO Fnnn. JPG	Save to Fnnn. JPG (where nnn= 0..999)
29	SAVE OK	Save JEPG ok
30	ERROR	Floppy is protected or error

APENDIX 4. -- NETWORK VIEWING

You can access live images or recorded images from any desktop over a TCP/IP networking environment by supported network viewer of KV-HD01, which is exclusively designed for KV-HD01 users.

System Requirements

1. Intel Pentium 233MHz at least.
2. 32 MB RAM
3. Window 95, 98, NT, and ME.
4. 4 MB Video card capable of 24-bit true color display.
5. 5 MB free hard-disk space for software installation.
6. 10-base T network for LAN operation.

1. The Network Viewer

1.1 Introduction to Network Viewer

The Network Viewer allows you to possibly access 16 units of the DVR from a remote desktop or a laptop over a TCP/IP networking environment. It can perform the following functions.

- View live images from the DVR
- Store, search, and review recorded video from the DVR HDD.
- Change regular record, event record, and timer properties.

BEFORE VIEWING IMAGES FROM A DESKTOP, YOU NEED TO HAVE YOUR DVR NETWORKED. YOU MUST OBTAIN A 10 BASE ETHERNET DATA CABLE (STANDARD RJ-45) TO CONNECT THE DVR TO YOUR LAN/WAN. AND THEN ENTER THE COMMUNICATION IN THE MAIN MENU TO SET THE IP ADDRESS.

RJ-45

PC

KV-HD01A

RJ-45 PIN configuration for Ethernet

RJ-45 socket

PIN NO.	PIN Assignment
1.	TX +
2.	TX -
3.	RX +
4.	Not Connected
5.	Not Connected
6.	RX -
7.	Not Connected
8.	Not Connected

Physical specification for Ethernet

Wire Type	Cat. 5
Connector Type	RJ-45
Max. Cable Length	30 M
Hub Wiring Configuration	Straight Through
PC Wiring Configuration	Cross Over

NOTE: For more details on network connections, please refer to APPENDIX 5

1.2 Install the Network Viewer to your PC

Install the Network Viewer from the included CD.

1. Exit all applications currently running on the chosen PC.

2. Insert the included CD in the CD-ROM drive; the program will execute installation automatically and then follow the on-screen instructions to proceed with the rest of the installation procedures when it appears.

3. After installation is complete, click on the **START** menu from your computer, point to **Programs/ Picture Viewer** to open up the program selection page as shown below. Click the **Network Viewer** icon to start the **Network Viewer** program.

Install the Network Viewer from the ZIP file.

1. Save the ZIP file to your PC and extract the file to a designated directory.

2. Open the extracted folder. The folder contains 5 files.

3. Click on the [icon] to execute installation and then follow the on-screen instructions to proceed with the rest of the installation procedure when it appears.

4. After installation is complete, click on the **START** menu from your computer, and point to **Programs/ Picture Viewer** to open up the program selection page as shown below. Click the **Network Viewer** icon to start the **Network Viewer** program.

NOTE: Please make sure the TCP/IP communication software has been properly set and configured in your computer. To check your TCP/IP settings, refer to APPENDIX 5

1.3 View DVR Video From A Remote PC

Follow the instructions below to use the Network Viewer to browse a DVR video from a remote location.

Upon entering the Network Viewer; the connection box will appear as follows.

1. Choose a channel number from the Channel drop-down list.

2. Assign a name for the chosen DVR.

3. Type in the password and IP of the device and click the **Add** button to add the device to the connection list.

4. Click the **Connect** button to establish the connection between the devices and the computer. To begin viewing images, click OK.

NOTE: Upon connection, the connection status box indicates the name and IP address of the selected device. If unable to connect, a "Fail" message appears on the screen right after the device IP address; otherwise an "OK" appears. To add more connections or units of the DVR, please repeat the above instructions.

NOTE: Please refer to APPENDIX 5 for details about proxy settings and network connections checking.

Function Buttons	Description
	Split-Screen display function bar. This allows you to display the connected device in a multi-format screen 1, 2x2, 3x3, and 4x4.
	Press to enter the selected device (Single device display mode). Select a device from the DEVICE LIST box to enable this button.
	Press to open the device setting page to add more devices for viewing.
	Press to leave the Network Viewer program.
	Connected devices display box. This box indicates the title and IP address of all connected devices.
	Device title and image display area. Display the title of each connected device and the time/day information of each displayed image on the top blue bar.

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Functions	Description
● Channel	Assign a display location when you have multiple devices connected.
● Name	This box allows you to assign a name to the chosen device.
● Password	Type the preset password for making a connection.
● URL of the Remote Device	Type the IP address which you preset for the device
● URL of a Proxy	Type your proxy server address when accessing the Internet via a proxy server.
● Port	Enter the designated port setting of your proxy server.
● Modify	Click to change the settings of a chosen device.
● Delete	Click to remove the connection of a chosen device
● Connect	Click to establish the connection between devices and the computer.
● OK	Click to access the display page of the Network Viewer
● Cancel	Click to exit the program of the Network Viewer.

Viewing images

View all the connected devices

Once the connection has been established, click OK to enter the Multi-device mode window. (See the sample screen below) This window displays all the connected devices in sequence which has been arranged when you established the connection.
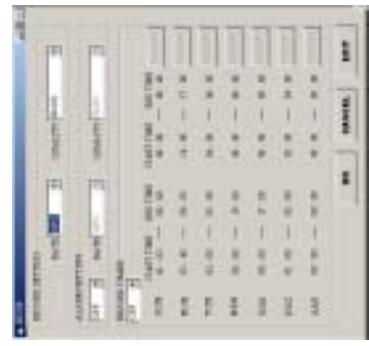
View single device

Follow either of the following instructions to get into the single device mode.

1. Select the desired device from the DEVICE LIST box on the Multi-device Mode. The 🔳 button will be enabled. Click the button to view the image of the selected device and have access to certain functional operations of the device via the network. (See the sample screen below.)

2. Double click the image display area of each screen.

NOTE: When viewing recorded images, a flash-in * mark indicating the most updated screen appears on the title bar of each display area.

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Function Buttons	Description
	Playback function bar. ● Play- Click to play a recorded video from the PLAY LIST. ● Pause- Click to freeze the image. ● Stop- Click to stop playing back the recorded video or cease recording. ● REC- Click to activate recording function of the device. ● Step- Click to view images picture-by-picture.
	Click to return to the Multi-Device mode.
	Click to save a viewing image into the local computer.
	Click to enter the **SETUP** page, which allows you to program the recording time, recording quality, and schedule recording.
	Click to exit the Network Viewer program.
	Multiplexer format list box. Select a MUX from the drop-down list that is connected with the DVR, so the Network Viewer will be able to display cameras corresponding to the camera input of the Multiplexer. If your MUX isn't available, please select the **Others** option for use. The Viewer will display cameras in thumbnail format. (Sequentially displaying images one after another in the adjacent display window)
	Recorded video list box. This box allows you to access all recorded video, which are stored in the HDD of the connected devices. To review a recorded video, just click an entry from the list and click the 🔳 button. PgUp/PgDn: To scroll up and down the list.
	DVR Status Box. This box indicates the selected device status. **PLAY**: The device is in the playback mode. **LIVE**: The device is in the live display mode. **WAIT**: The device is processing the command. **PAUSE**: Pause the image.
	This allows you to search a recorded video kept in the HDD of the device. Enter the MONTH/DAY/YEAR HOUR: MINUTE you wish to search and click GO to proceed.
	Split-Screen display function bar. This allows you to display the selected device in a multi-format screen 1, 2x2, 3x3, and 4x4.
	Image display area. Display the images of each camera and the title and time/date information on the top blue bar. Double click the image to view a full screen of the camera.

1.4 Change the Record & Timer Properties Via the network

Follow the instructions below to reconfigure the record and schedule recording settings via the network.

A.

Set the regular record settings

1. When in the single –device mode, click to enter SETUP page. (See the sample screen as above A)

2. Select a desired recording rate and Quality from the respective drop-down list

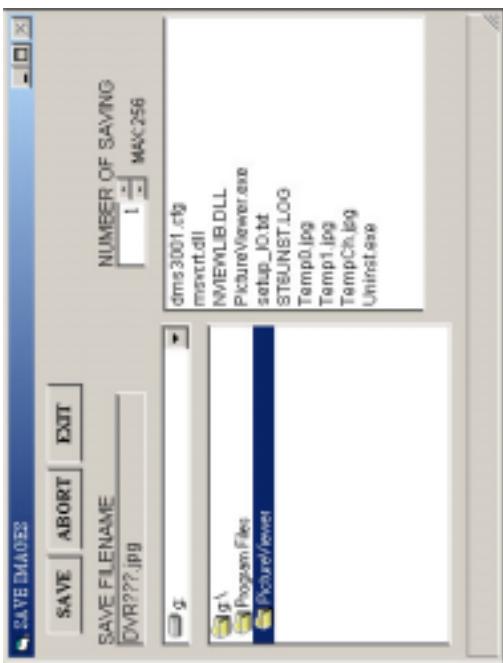3. Click the **OK** tag to proceed.

Set the Alarm record settings

1. When in the single –device mode, click to enter SETUP page. (See the sample screen as above A)

2. Set the ALRM SETTING to ON to enable the drop-down list in the ALARM SETTING area.

3. Select a desired recording rate and Quality from the respective drop-down list.

4. Click the **OK** tag to proceed.

Set the record timer

1. When in the single –device mode, click to enter SETUP page. (See the sample screen as above A)

2. Set the **RECORD TIMER** to **ON** to enable the **RECORD TIMER** setting area. All of the **MODIFY** buttons will appear.

3. Click the **MODIFY** button to set the schedule for recording for each day. (See the sample screen below) Enter in both the **START TIME & END TIME** boxes a specific **Hour: Minute** and click **OK** to return to the **SETUP** page.

4. When all required settings are done, click **OK** to proceed.

1.5 Archive Images To The Computer

A viewing playback images can be stored into a local PC in the JPEG format. Follow the following instructions to save the viewed images to your PC.

1. Whenever in the playback mode press the Pause button to freeze the screen and enable the button.

2. Press to enter the following sample screen.

3. Select a folder on the computer for copying images to.

4. Enter the number of subsequent images into the **NUMBER OF SAVING** box you wish to save.

5. Click the **SAVE** tag; the program will automatically copy the displayed images starting with the most updated image (with ∗ in the tile bar) into the designated folder,. The images are saved in the DVRxxx.jpg file name, which are displayed in the on lower-right box. To view a saved image, please follow the instructions in the next section to proceed.

3. Convert Image Program

This program allows you to convert archived images into a 720x480 format, which allows you view the archived images via a computer with a JPEG compatible program. Please follow the instructions below to proceed.

1. Click the **START** menu from your computer, and point to the **Programs/Picture Viewer** to open up the program selection page. Click the **Convert Image** button to start the **Convert Image** program. (The Image Viewer is shown as a sample screen below.)

2. Click the ⬜ button to select a folder where files are kept you wish to convert from the **Source Path** box.

3. Click the ⬜ button to select a folder where you wish to convert files in from the **Destination Path** box.

4. Click the **Transform [T]** button to proceed.

5. Click the **Cancel [C]** button to stop processing at any time while converting.

2. View a still JPEG image

This is image integrity-protected software. It not only allows you to view an archived image from a floppy or a HDD of a computer, but to also protect an archived image from reproduction or interpolation. If an image isn't in the original format made by a DVR, the Image Viewer will not display the image and instead send a warning message" **Wrong File, Can't Open**". Follow the following instructions to open an archived image from a floppy disk or a HDD.

1. Click the **START** menu from your computer, and point to **Programs/Picture Viewer** to open up the program selection page. Click the **Image Viewer** icon to start the **Image Viewer** program.
(See a sample screen below.)

2. Select a folder where the files are kept and click on a file you wish to display from the upper-right box or click on the AUTOPLAY button to display automatically all the files in the selected folder.
Each file will be displayed for 2 seconds on the screen.

3. Click the **PRINT** button to get a displayed image printed out from a printer.

4. If you wish to transfer a displayed image into a 720x480 format, click the **SAVE 720x480** to proceed.

APPENDIX 5

How to set a PC without a proxy server

Follow the instructions below to set a PC without proxy server.

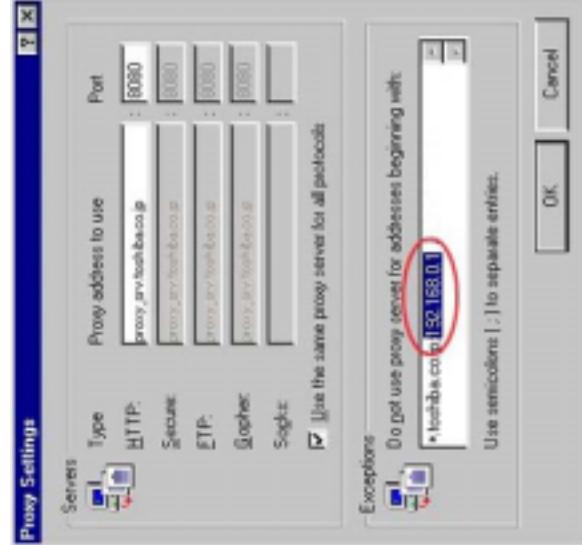1. Open your IE (Browser), click Tools and point to Internet Options.

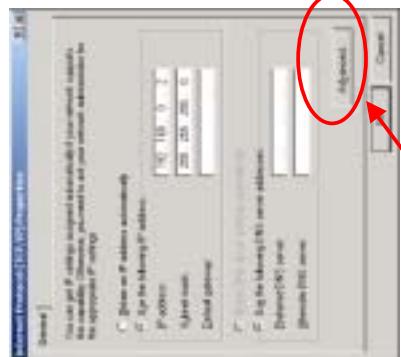2. Click **Connections** tag and click **LAN Settings** when it appears.

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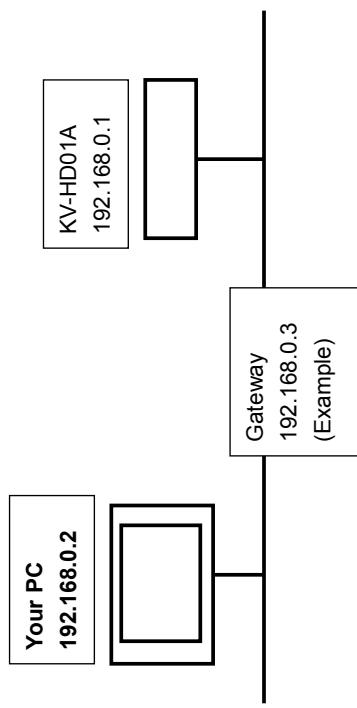3. Click **the Advanced** tag to enter **Proxy Settings** page.

4. Add KV-HD01A's IP address with semicolons (;192.168.0.1).
   The PC will not request and search the proxy server when connecting to the KV-HD01A.

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How to set TCP/IP (using a crossover cable)

Please type in Default gateway.   (e.g.192.168.0.3)

Your PC 192.168.0.2

Gateway 192.168.0.3 (Example)

KV-HD01A 192.168.0.1

How to confirm your PC conditions

Ping 192.168.0.1 (KV-HD01A   IP address)

If there are replies from KV-HD01A, the network viewer will be able to connect.

Note: If the proxy setting has not been set up, there will be no replies from the KV-HD01A.

How to set up subnet masking

Your PC
192.168.0.2

KV-HD01A
192.168.1.1

The following table shows the IP address, Class and Subnet mask to be used:

IP Address Range	Subnet Mask	Class
1.0.0.0 – 126.255.255.255	255.0.0.0	A
128.0.0.0 – 191.255.255.255	255.255.0.0	B
192.0.0.0 – 223.255.255.255	255.255.255.0	C

Please ask your administrator if you have questions regarding setting IP addresses.

How to confirm connection between PC and KV-HD01A without the network software

KV-HD01A has a web server function that enables it to be controlled without the network software.

However, the function should be used only by service personnel.

Type the ip address of the DVR in the address bar (e.g. http://192.168.0.1)

Type in the User name and password. Kvhd01a and 9999 are the defaults.

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LIMITED WARRANTY
DIGITAL VIDEO RECORDER

Promptly register your product with Toshiba on-line at www.toshiba.com/taisisd. By registering your product you will be eligible for periodic updates, announcements, and special offers applicable for your product. You will have access to extended warranty options, upgrades (as applicable), useful tips, on-line troubleshooting, and the ability to schedule service on-line if necessary. The Imaging Systems Division of Toshiba America Information Systems, Inc. ("ISD") makes the following limited warranties. These limited warranties extend to the Original End-User ("You[r]").

Limited Two (2) Year Warranty of Labor and Parts
ISD warrants this product and parts against defects in material or workmanship for a period of two years from the date of original retail purchase by the end-user. During this period, ISD will repair or replace a defective product or part with a new or refurbished item. The user must deliver the entire product to an ISD authorized service center. The user is responsible for all transportation and insurance charges for the product to the Service Center. ISD reserves the right to substitute Factory Refurbished Parts and / or Factory Refurbished Product in place of those in need of repair.

Step-by-step Procedures - How to Obtain Warranty Service
[1] Verify operation of the unit by checking the instruction manual and web site for the latest updates at

www.toshiba.com/taisisd

[2] If there is a defect in material or workmanship, schedule service on-line or contact the Digital Support Center for an individual Tracking Number and the location of the nearest ISD authorized service center. To contact technical support call (877) 855-1349.
[3] Arrange for delivery of the product to the ISD authorized service center. Products must be insured and securely packed, preferably in the original shipping carton. A letter explaining the defect and a copy of the bill of sale or other proof of purchase must be enclosed with a complete return street address and daytime telephone number. The Tracking Number should also be indicated on your documents. Charges for transportation and insurance must be prepaid by the end-user.

Your Responsibility, warranties are subject to the following conditions:
[1] You must retain the bill of sale or provide other proof of purchase.
[2] You must schedule service within thirty days after you discover a defective product or part.
[3] All warranty servicing of this product must be made by an ISD authorized service center.
[4] The warranty extends to defects in material or workmanship as limited above, and not to any products or parts that have been lost or discarded by user. The warranty does not cover damage caused by misuse, accident, improper installation, improper maintenance, or use in violation of instructions furnished by ISD. The warranty does not extend to units which have been altered or modified without authorization of ISD, or to damage to products or parts thereof which have had the serial number removed, altered defaced or rendered illegible.

ALL WARRANTIES IMPLIED BY STATE LAW, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY LIMITED TO THE DURATION OF THE LIMITED WARRANTIES SET FORTH ABOVE. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply. WITH THE EXCEPTION OF ANY WARRANTIES IMPLIED BY STATE LAW AS HEREBY LIMITED, THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WITH RESPECT TO THE REPAIR OR REPLACEMENT OF ANY PRODUCTS OR PARTS. IN NO EVENT SHALL ISD BE LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation may not apply. No person, agent, distributor, dealer, service station or company is authorized to change, modify or extend the terms of these warranties in any manner whatsoever. The time within which an action must be commenced to enforce any obligation of ISD arising under this warranty or under any statute, or law of the United States or any state thereof, is hereby limited to one year from the date you discover or should have discovered, the defect. This limitation does not apply to implied warranties arising under state law. Some states do not permit limitation of the time within which you may bring an action beyond the limits provided by state law so the above provision may not apply to user. This warranty gives the user specific legal rights, and user may also have other rights, which may vary from state to state.

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Imaging Systems Division
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TOSHIBA

SECTION 2
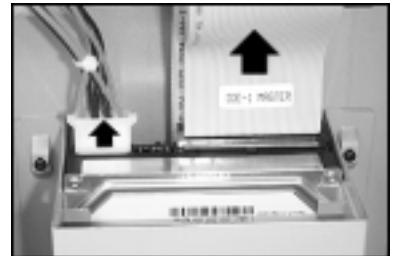# ADJUSTMENT

1. IDE Hard Disk Installation

Usually, the unit comes with one hard disk drive installed in the compartment HD3, which is default-configured as a master. If the unit was shipped without a hard-disk drive, please install hard disk in compartment HD3 first. The jumper settings configuration of the installed hard disk drives for the unit and compatible drives which can be used with this unit are listed in the table below. To install a second hard disk drive in compartment HD1 or exchange other drive, please take the following steps.

The jumper settings of hard disk drives for the system

	Location	Jumper
IDE 1	Compartment HD 1	Master
IDE 1	Compartment HD 2	Slave
IDE 2	Removable bay HD 3	Master (Default)

1. Unscrew all the mounting screws on the top cover of the unit and detach it first. Unplug the interface connector and the power connector to the drive. (Go to the next step, if there is no drive in the this compartment.)

2. Unscrew the secured screws to detach the hard disk rack.

3. Setting the jumpers of your hard-disk drives:
   The way to set the jumper of a drive varies between manufacturers; please refer to the instructions on the drives to configure it.
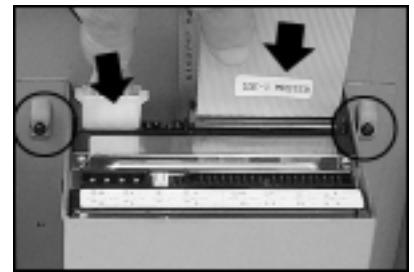   Configure the drive as a **slave** which is located on the upper rack and the drive as a **master** which is located on the lower rack.

4. Secure the drive in the rack using two mounting screws in both the side-mounting holes. Please don't over tighten the screws, otherwise that may damage the drive.
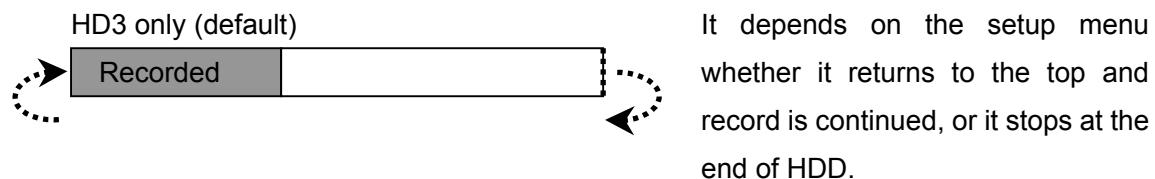

5. Attach the interface connector and the power connector to the drive. Please make sure that you attach the interface connector labeled **IDE Slave** to the drive in the upper rack and the interface connector labeled **IDE Master** to the drive in the lower rack.
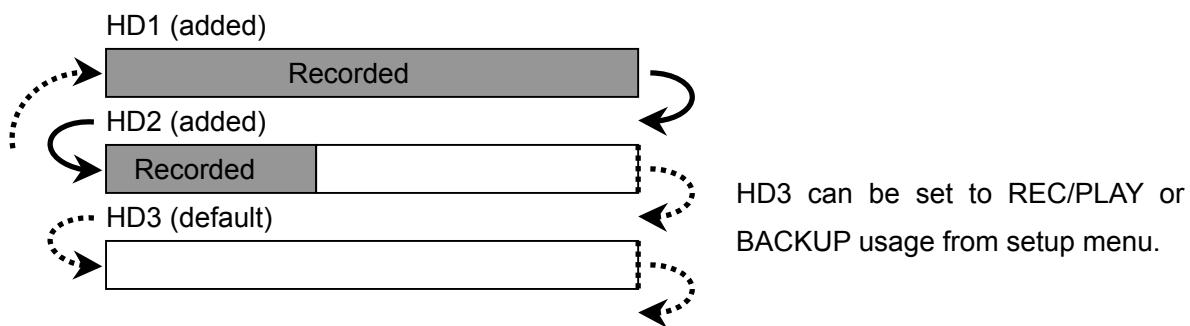
2. Hard disk recording

KV-HD01A use standard IDE hard disk as its main storage. User needn't to partition nor format hard disks before attaching them to KV-HD01A. However, jumper setting of master/slave is still needed. System support up to 3 hard disks, named HD1, HD2 and HD3. HD1 and HD2 are used as internal hard disks, they are attached to the same cable, conflict of master/slave must be avoided. HD3 can be set to REC/PLAY or BACKUP usage from setup MAIN MENU – DISK SETTING menu. When all 3 hard disks was attached and HD3 set to REC/PLAY, the storage capacity could reach 80 (79)MB *3 = 240 (237)MB.*

Disk setup and the record order

HD3 only (default)

Recorded	

It depends on the setup menu whether it returns to the top and record is continued, or it stops at the end of HDD.

When have not been attached only HD3, don't set the menu setup to HD3 for BACKUP.
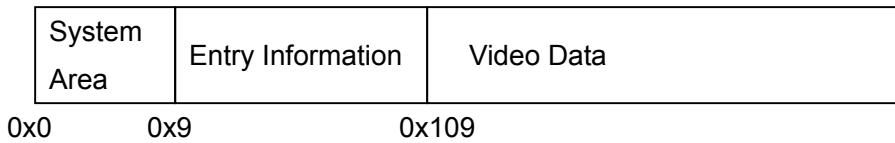NO BUCKUP SOURCE message will be appeared. IF REC button pushed, the unit will start to record that is not related the menu setup.

HD1 (added)

Recorded

HD2 (added)

Recorded	

HD3 (default)

HD3 can be set to REC/PLAY or BACKUP usage from setup menu.

3. Hard disk writing format

The whole hard disk space can be separated to 3 parts, System Area, Entry Information and Video Data, as the following.

Hard disk space overview

System Area	Entry Information	Video Data

0x0   0x9   0x109

System Area (LBA: 0x0)

Field	Offset(Byte)	Length(Byte)	Description
ID	0	16	Fixed,
EntryTable_SA	16	4	Fixed, 0x9
AlarmTable_SA	20	4	Fixed, 0x89
VOBS_SA	24	4	Fixed, 0x109
LastEntryNum	28	4	Not used now
LastAlarmNum	32	4	Not used now
LastRecSectNum	36	4	Not used now

Entry Information (LBA: 0x9)

Entry Information is composed of ENTRY _MAT and ENTRY_LIST

ENTRY_MAT (Entry Management Table)

Start from LBA 0x9

Field	Offset(Byte)	Length(Byte)	Description
FirstRound	0	1	Not used now
FirstRoundV	1	1	1: All Video Data area was recorded at least once.
Reserved0	2	2	
CurrWrtElem	4	4	Index point to the current used entry in Entry List.
FirstElem	8	4	Index point to the first entry in Entry List.
Reserved1	12	4	

Entry List (LBA: 0xA)

Entry List Start from LBA#0xA, contain up to 2015 entries, each entry have the following fields.
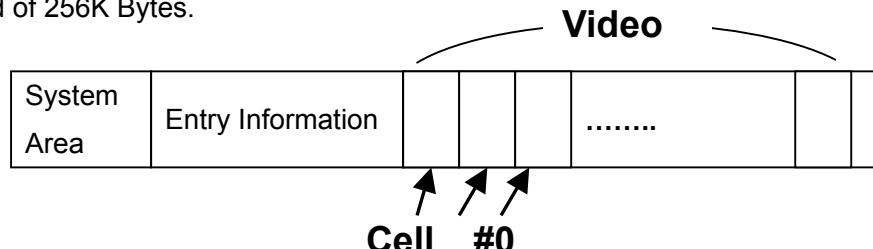
(1 Entry = 32 Bytes)

Field	Offset(Byte)	Length(Byte)	Description
Date	0	4	Starting date
Time	4	4	Starting time
EndDate	8	4	Ending date
EndTime	12	4	Ending time
StartLBA	16	4	Starting LBA
EndLBA	20	4	Ending LBA
Reserved0	24	8	

Video Data

Video Data Area contains integer numbers of CELLs, a CELL is a basic unit for system to REC/PLAY to/from hard disk. A CELL is equal to 4 VOBUs , each VOBU can be 2..4 images, depend on recording quality set in setup menu.

CELL

CELL is consisted of 256K Bytes.

VOBU (Video Object Unit)

VOBU is consisted of 64K Bytes.

One VOBU (= 64KB) contains 2 to 4 images, depend o n image quality.
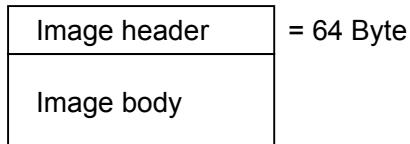
Image

An Image contains Image Header and Image Body.

Image header	= 64 Byte
Image body	

Image Header (= 64 Bytes)

Field	Offset(Byte)	Length(Byte)	Description
Fifo	0	2	Image Size (in unit of 32 Word)
Stamp	2	1	Stamp Flag
Reserved0	3	1	
Date	4	4	Image Date
Time	8	4	Image Time
Quality	12	1	(0,1,2) = (High, Standard, Basic)
Rate	13	1	(0…9)
SF	14	1	Scaling factor
Mux	15	1	Multiplexer (1 = on)
ID	16	1	Sequence No.
JumpOffset	20	4	Not used now
Reserved0	24	40	

Image Body

The image body contains a standard jpeg file exclude file header. The actual size would be limited to (32K, 24K or 16K) minus header size (= 64Bytes). When the JPEG size is larger than the size of a target, the limit size is set up small automatically. At this time, quality of image becomes bad rather than what was aimed at.

4. Key Operation for Maintenance

4.1 Software version check

1. Push SETUP button in order to make it MENU mode.

2. Simultaneously press ☺ PAUSE/STEP and ▷ buttons for 3seconds or more.

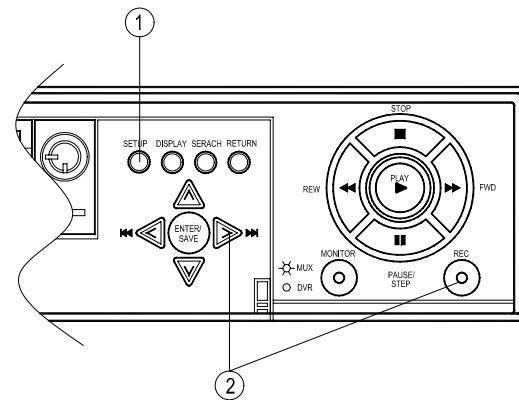3. The blinking message of software version no. is appeared.

Note: Please refer how to update software to 3.3 Updateing System Software in OPERATING MANUAL.

```
MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM

VER 2.5T Jan 03 2002 B
GO TIME/TITLE PAGE
```

4.2 Factory default setting

This setting is used when eliminating the operation logs in addition to the DEFAULT setting in system setup menu. The contents recorded in HDD are not erased. Reformat will be carried out if needed.

1. Push SETUP button in order to make it MENU mode.

2. Simultaneously press ⊙ REC and ▷ buttons for 1seconds or more.

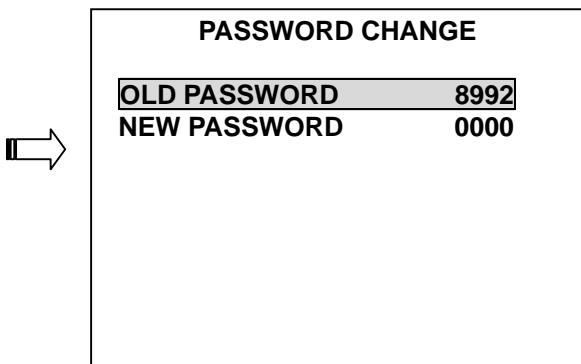3. The blinking message of FACTORY DEFAULT is appeared. Wait for about 20 seconds.
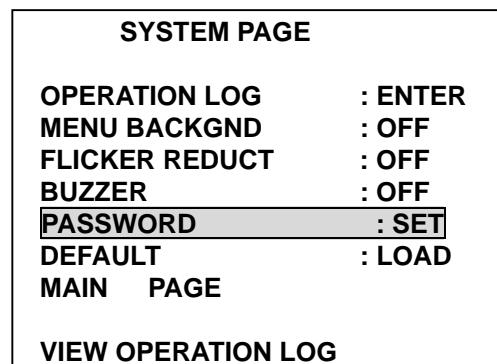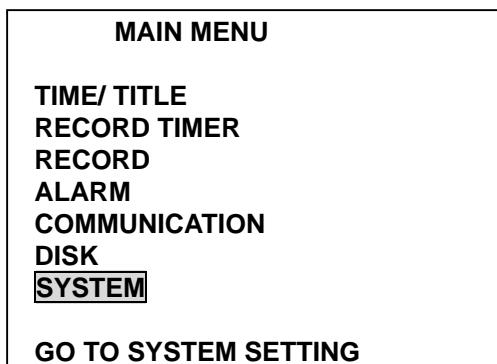
   The buzzer sounds two times with short beeps.
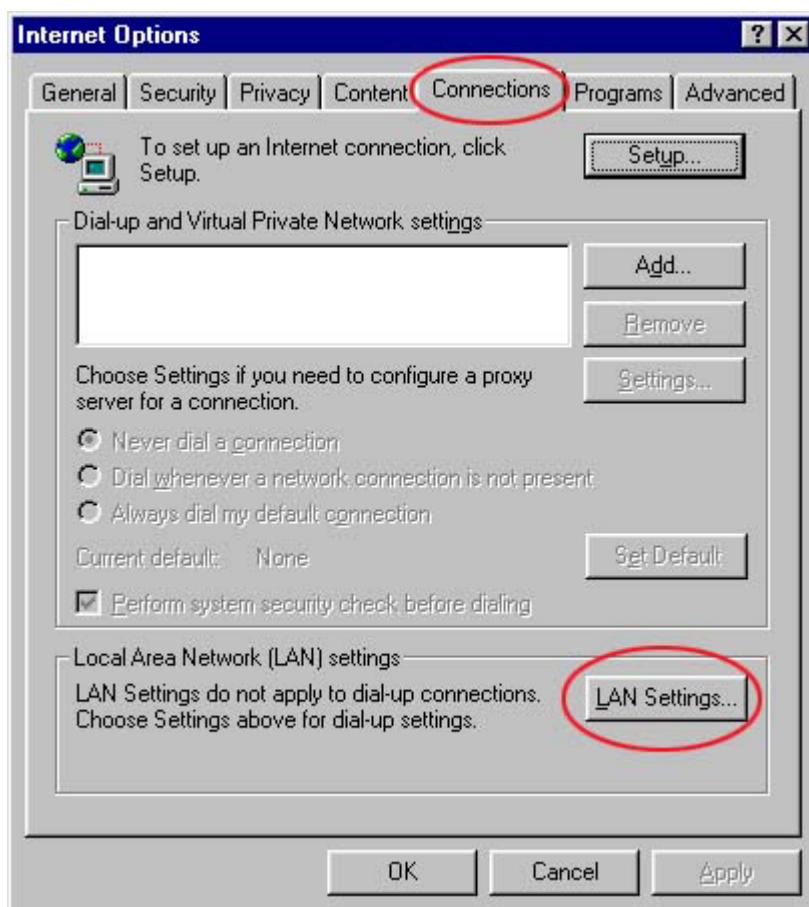
4.3 Almighty password

The PASSWORD option is used to set a 4 digit number password to prevent any unauthorized re-formatting of the hard disk drives and to use the network viewer.
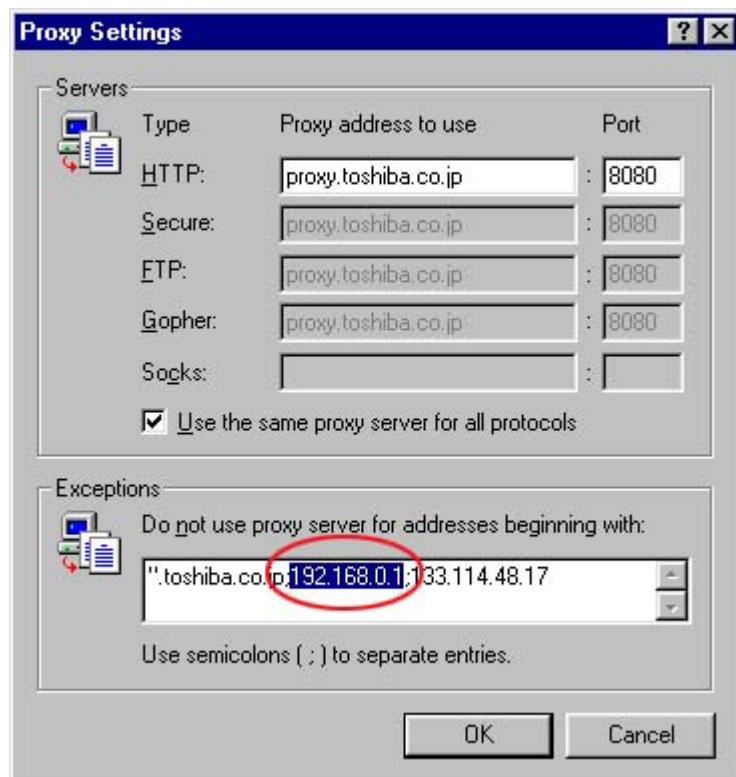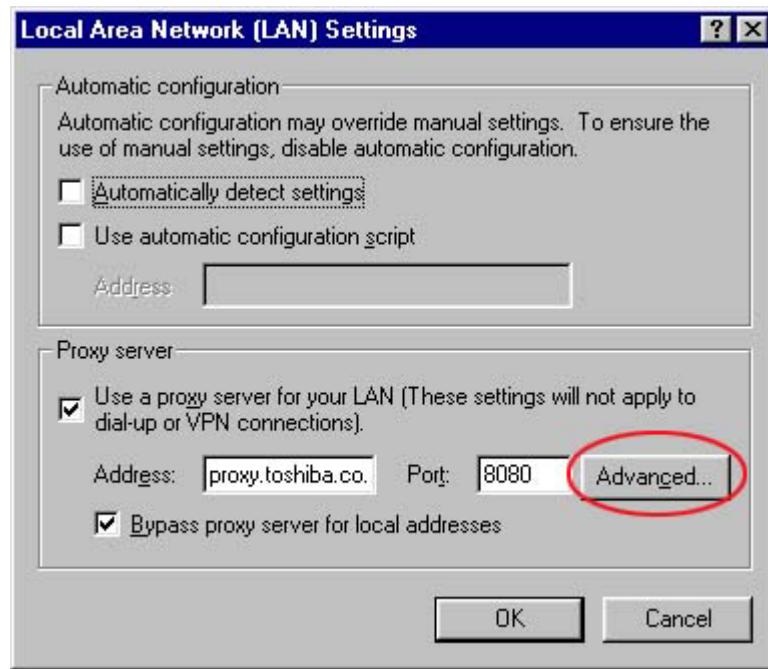
The Almighty password **"8992"** was prepared when user has forgotten old password. Whatever it may be set up, release of the disc formatting password is possible. However, even if it inputs "8992" into network software, it cannot enter. Only using NEW PASSWORD can release in network software.

```
        MAIN MENU

TIME/ TITLE
RECORD TIMER
RECORD
ALARM
COMMUNICATION
DISK
SYSTEM

GO TO SYSTEM SETTING
```

```
        SYSTEM PAGE

OPERATION LOG      : ENTER
MENU BACKGND       : OFF
FLICKER REDUCT     : OFF
BUZZER             : OFF
PASSWORD            : SET
DEFAULT            : LOAD
MAIN    PAGE

VIEW OPERATION LOG
```

```
     PASSWORD CHANGE

OLD PASSWORD        8992
NEW PASSWORD        0000
```

5. Network setting for service staff.

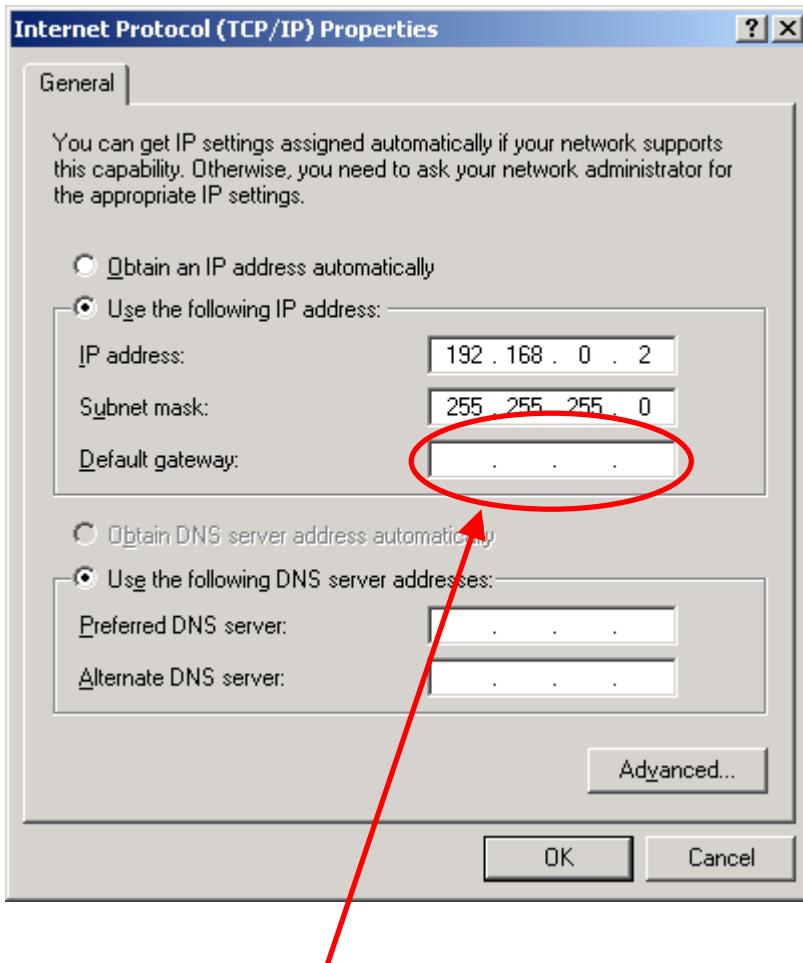## 5.1 How to set PC without proxy server.
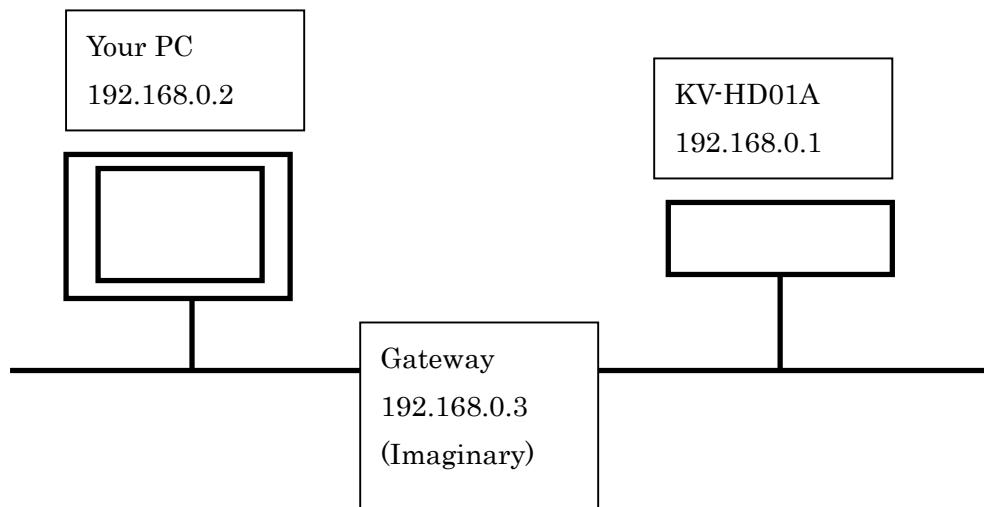
Add KV-HD01A's IP address with semicolons (;192.168.0.1).

Then PC do not request and search to the proxy server for using to connect KV-HD01A.

5.2 How to set TCP/IP.

Internet Protocol (TCP/IP) Properties   ? ☒

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

⦿ Use the following IP address:

IP address: 192 . 168 . 0 . 2

Subnet mask: 255 . 255 . 255 . 0

Default gateway: ___ . ___ . ___ . ___

○ Obtain DNS server address automatically

⦿ Use the following DNS server addresses:

Preferred DNS server: ___ . ___ . ___ . ___

Alternate DNS server: ___ . ___ . ___ . ___

Advanced...

OK   Cancel

Please type in Default gateway.
 ex)192.168.0.3

Your PC
192.168.0.2

KV-HD01A
192.168.0.1

Gateway
192.168.0.3
(Imaginary)

5.3 How to confirm your PC conditions.

(1) Command prompt mode
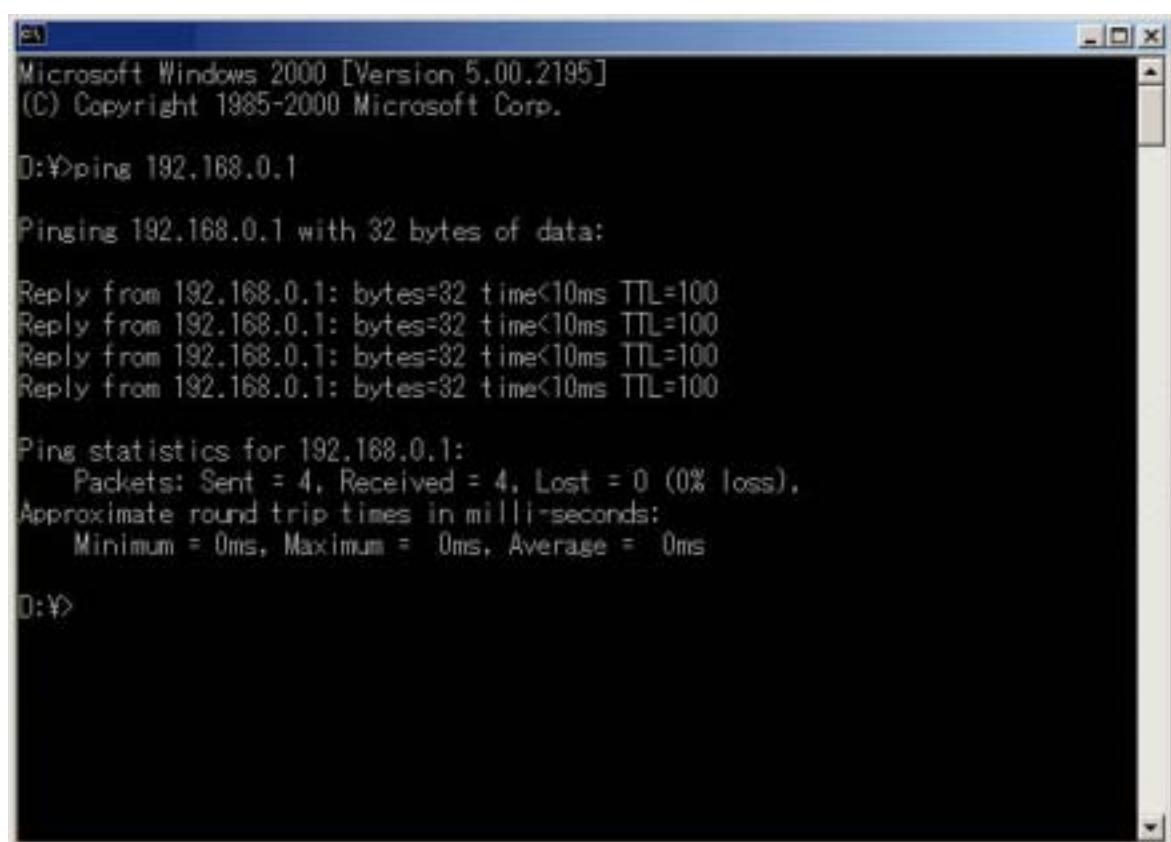
    Use the command prompt window.

    In windows™ , Menu bar [START] – [Program] – [Accessory] – [Command prompt (or DOS mode)]

(2) Type [ping & IP address of KV-HD01A]

  Ex) ping 192.168.0.1 (KV-HD01A   IP address)

      If there are replies from KV-HD01A, the network viewer soft may be able to see.

 Note: The proxy setting have not set up, there is not replies from KV-HD01A.

```
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

D:\>ping 192.168.0.1

Pinging 192.168.0.1 with 32 bytes of data:

Reply from 192.168.0.1: bytes=32 time<10ms TTL=100
Reply from 192.168.0.1: bytes=32 time<10ms TTL=100
Reply from 192.168.0.1: bytes=32 time<10ms TTL=100
Reply from 192.168.0.1: bytes=32 time<10ms TTL=100

Ping statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms

D:\>
```

5.4 How to confirm connection between PC and KV-HD01A without the network software.

KV-HD01A has a web server function. So it is able to control without network software.

But the function is used only service person.
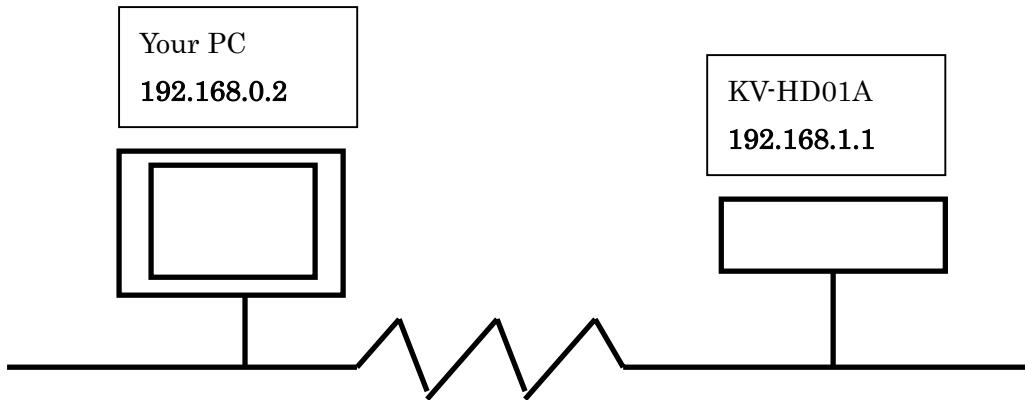
Type up "http://192.168.0.1"

Type in User name: kvhd01a and password as default 9999.

6. Subnet musk setting

6.1 How to connect on class B condition.

The connection over the class has a relation to a setup of a subnet mask.

ex) PC IP address   **192.168.0.2**

     KV-HD01A IP address   **192.168.1.1**

(1) PC IP address   **192.168.0.2**   put into the binary code

     1100 0000 . 1010 1000 . 0000 0000 . 0000 0010

(2) KV-HD01A IP address   **192.168.1.1**   put into the binary code

     1100 0000 . 1010 1000 . 0000 0001 . 0000 0001

(3) Find first deferent place from big place.

         1100 0000 . 1010 1000 . 0000 0000 . 0000 0010

         1100 0000 . 1010 1000 . 0000 0001 . 0000 0001

This result is able to find the most last bit of subnet mask. (until more one big place)

So you have to set the subnet masks as followed.

         1111 1111 . 11111 1111 . 1111 1110 . 0000 0000   put into the decimal code.

     255.255.254.0

The "255.255.254.0" is required the system as the subnet masks.

(4) The more detail is written this section.

The subnet masks are divided two parts, the network number and the host number.

1111 1111 . 11111 1111 . 1111 1110 . 0000 0000

Network Number   **Host Number**

AA) The all place of Network Number have to be "1".

You may think like these.

0.0.0.0 is an almighty one. that is wrong all 0(zero).

1000 0000 . 0000 0000 . 0000 0000 . 0000 0000 = 128 . 0 . 0 . 0 is strong one.

If the number of HOST increases, looking for HOST will take time.

The minimum quantities of host are better for network (speed).

BB) The all place of HOST Number have to be "0".

For example, the subnet mask is 1111 1111 . 11111 1111 . 1111 1110 . 0000 0000

It is decided that the Host Number do not use all "0(zero)" and all "1".

So the host (IP address) in this same subnet musk group are

from 0 . 0000 0001 to 1 . 1111 1110 = 510 kinds

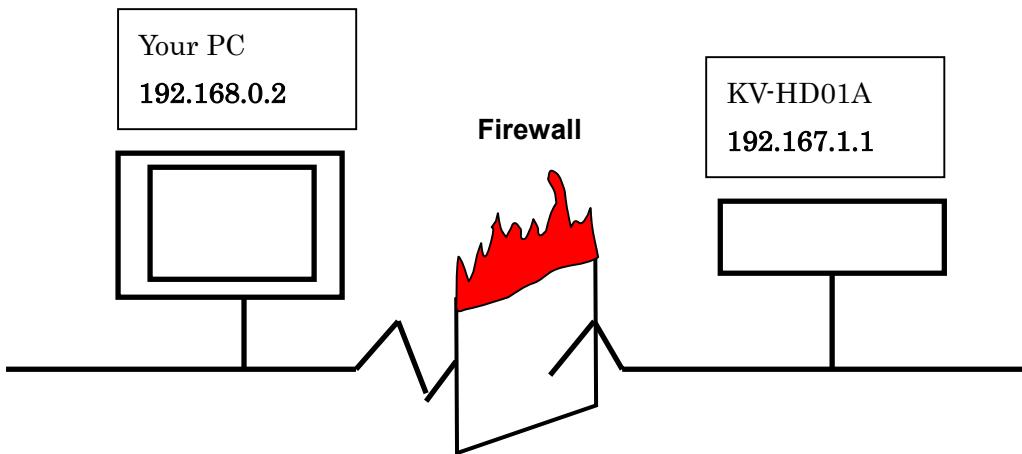# 6.2 The test of Class A setting.

The viewpoint is same in the class A setting.

TEST)   PC IP address   **192.168.0.2**

        KV-HD01A IP address   **192.167.1.1**

Find the subnet masks in these conditions.

192.168.0.2   **1100 0000 . 1010 1000 . 0000 0000 . 0000 0010**

192.167.1.1   **1100 0000 . 1010 0111 . 0000 0001 . 0000 0001**

                       1111 1111 . 1111 0000 . 0000 0000 . 0000 0000   put into the decimal code.

                       255.240.0.0

The view is the same to the Class B setting.

But the almost class A network system have the firewall.   The setup is needed on firewall machine.
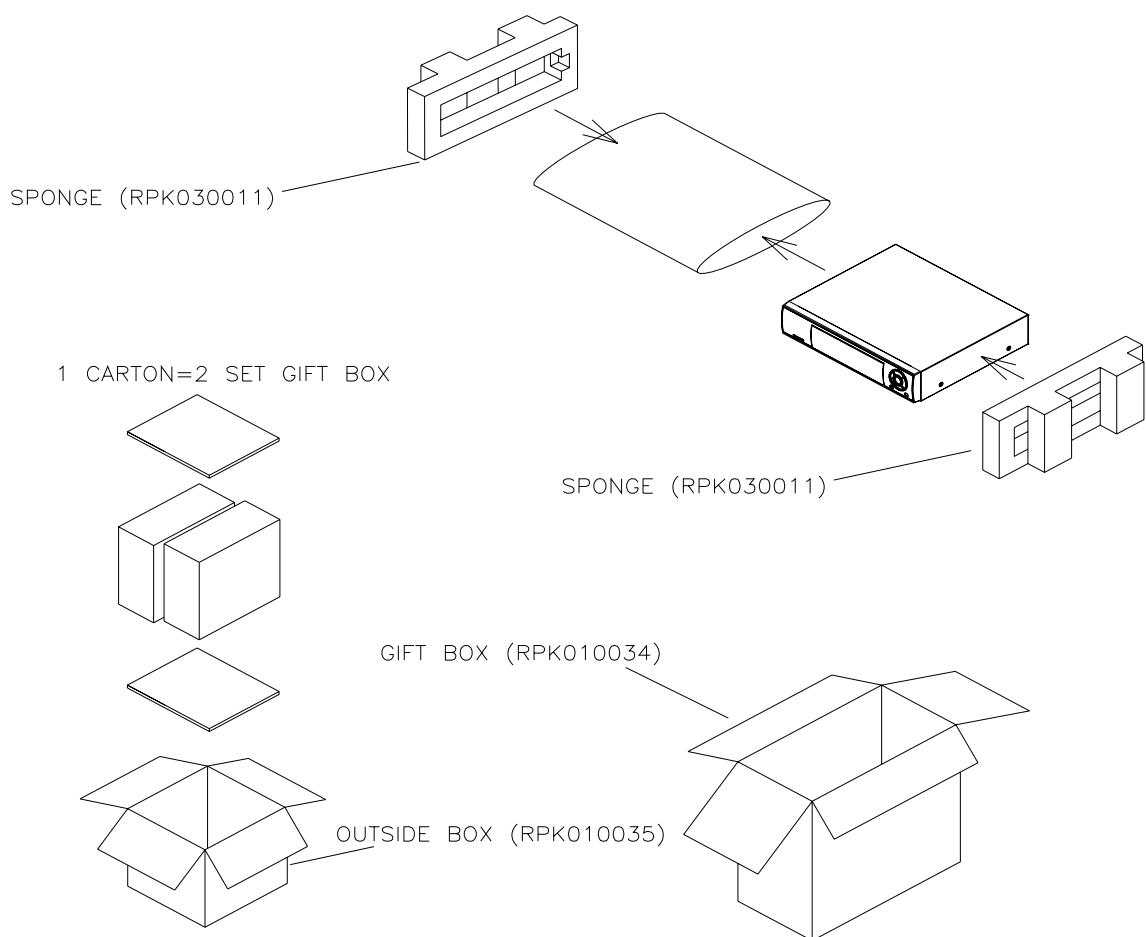
Ask or request how to set firewall to administrator.

In the state that it cannot pass to the firewall, the ping does not become possible.
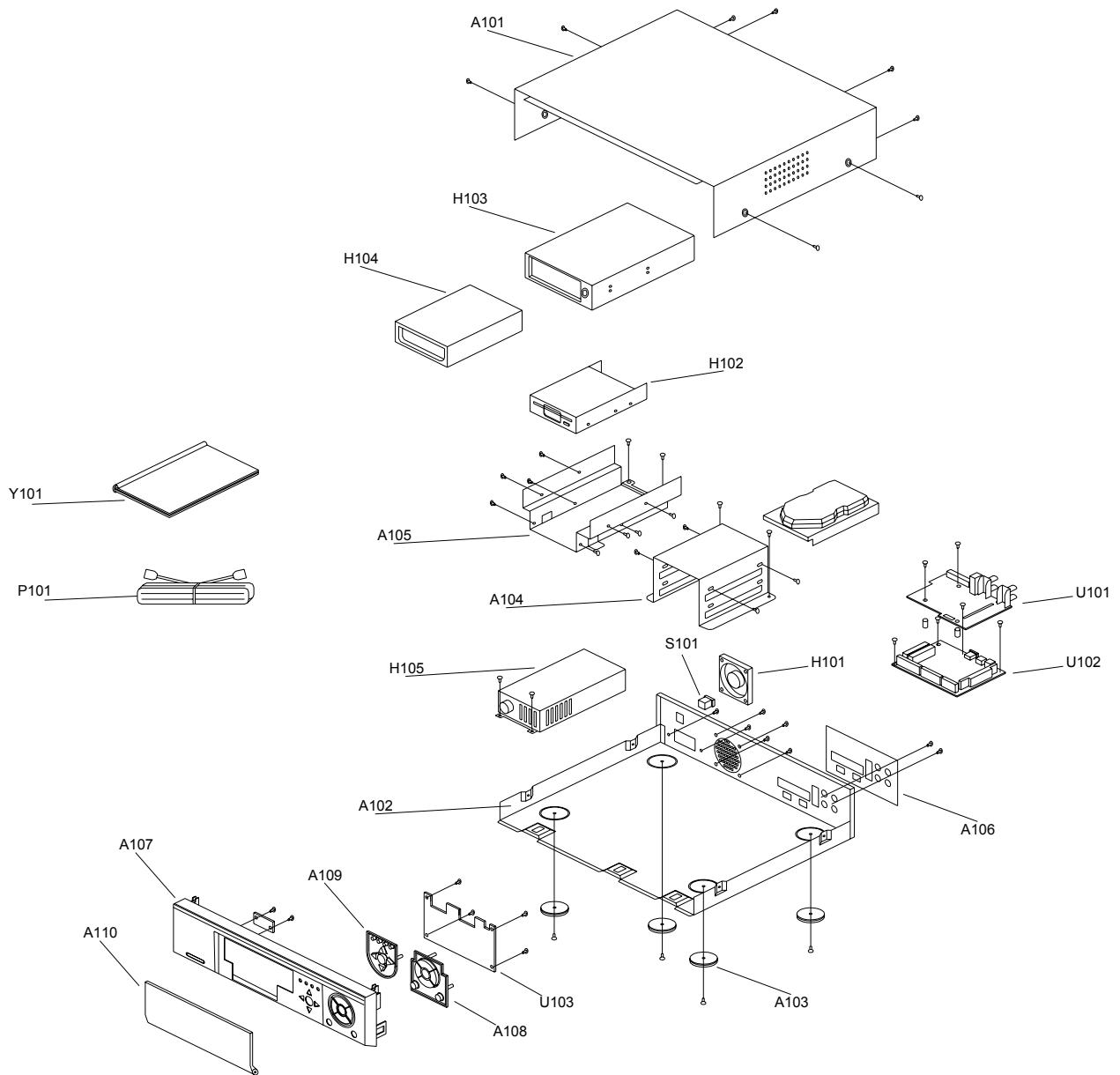
SECTION 3
EXPLODED VIEWS AND PARTS LIST

1. EXPLODED VIEWS

1.1 Packing Assembly

SPONGE (RPK030011)

1 CARTON=2 SET GIFT BOX

SPONGE (RPK030011)

GIFT BOX (RPK010034)

OUTSIDE BOX (RPK010035)

1.2 Chassis Assembly

A101

H103

H104

H102

Y101

A105

A104

U101

U102

P101

H105

S101

H101

A102

A106

A107

A109

A110

U103

A108

A103

2. Parts List

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
ELECTRICAL PARTS			
U101	23588773	JPEG BOARD	: PCBMD3001EA
U102	23588794	CPU BOARD	: PCBMD-D6006
U103	23588789	KEY BOARD	: MPK-3001KLD
H101	23588800	FAN HD01A	: MFN1460223
H102	23588801	FDD DRIVE	: MFP0001
H103	23588802	HDD FIXER	: MHD-BOX0003
H104	23588803	HDD RACK	: MHD-BOX0002
H105	23588798	SW.POWER	: MADS-SPX6160A1
S101	23588814	POWER-SW	: MSW03010001
P101	23588799	POWER CORD	: MWR031800001

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
MECHANICAL PARTS			
A101	23588810	TOP COVER	: QCS04T00010
A102	23588809	BASE COVER	: QCS04B00010
A103	23588808	STAND	: QBF030003
A104	23588811	HDD2 RACK	: QRK0400020
A105	23588812	FDD RACK	: QRK0400030
A106	23588813	REAR PV	: RNP0400020
A107	23588815	FRONT PANEL	: QCS04F00010
A108	23588816	VCR KEY	: QKY0200030
A109	23588817	DATA KEY	: QKY0200040
A110	23588822	DOOR	: QDR0400010
Y101	23588823	MANUAL	: RMN040200010

SECTION 4
DIAGRAMS AND PC BOARDS

1. BLOCK DIAGRAMS

1.1 CPU BOARD

```
                        EDO RAM                FDC              ETHERNET
                                              RS232

  BIOS
  Flash Disk
                      DM&P
  Battery
  32.768kHz           M6117D                                      to JPEG BOARD

  Clock GEN.          386SX Compatible Series
  80MHz
  14.318MHz

                       IDE DISK
```

1.2 JPEG BOARD

```
  MUX VIDEO in    ⊗                    ⊗                         MUX VIDEO out

                                     OSD 2

  S-VIDEO in           DECORDER    Y/C 16Bits    ENCORDER        S-VIDEO out
  VIDEO in                                                       VIDEO out

                  CPLD                        ⊗
  Key
  LED                                            OSD 1
  Alarm
                                              JPEG
                                              Compression
                                              &
                                              Decompression

                                                               to CPU BOARD
```

SECTION 5
SPECIFICATIONS

1. SPECIFICATIONS

Image System	NTSC	PAL
Resolution	720 x 480 pixels	720 x 576 pixels
Video Input	BNC x 2, S-Video x 1	
Video Output	BNC x 2, S-Video x 1	
Storage Media	UP to 3 IDE Hard Disks (One mobile Rack)	
Image Format	M-JPEG	
Critical Image Archiving	1.44MB FDD	
Recording Rate	Up to 60 fields/sec	Up to 50 fields/sec
Image Compression	High/ Standard/ Basic	
Recording Mode	Schedule/ Manual/Alarm/Continuous	
Playback Speeds	Fast Forward /Reverse: 1x, 2x, 4x, 8x, 16x, 30x, Slow Forward/Reverse: 1/2x, 1/4x, 1/8x, 1/16x Picture By Picture Playback	
Access To Recording	Full List Search, Time Search, and Event Search	
Title	12 Characters	
On Screen Display & Setup	Title/ Time/Date/Main Menu	
Alarm Input	1 x NO or NC Contact Programmable	
Alarm Output	Yes (5V / 0V 5mA max.)	
Full-Disk Alarm Output	Yes	
Trigger Output	1	
Operation History Log	Up to 2016 events	
Key Lock	Yes	
RS-232 port	Yes	
Software Upgradeable	Yes	
Password Control	Yes	
Power Interruption Recovery	Automatic Restart After Power Interruption /Recording Operation Resume	
Power Input	AC 100~240 V Input (50 Hz/60 Hz); 1 A Max	
Dimensions	374 x 430 x 90 mm	
Operation Temperature	5°~45°C (41°~ 113°F)	

TOSHIBA CORPORATION

1-1, SHIBAURA 1- CHOME, MINATO - KU, TOKYO 105 - 8001, JAPAN